GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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Editorial Notes.

Valuation and Taxation of Gas Undertakings.

THIS is a perennial question which has grown enormously in importance in these days of heavy rating and taxation, and with the remarkable changes that have come over the business and obligations of the gas industry. A highly interesting communication on the subject [see pp. 359-62] was made by Mr. R. M. Simpson, of Denny, to the last meeting of the North British Association of Gas Managers; but the discussion was deferred to the forthcoming meeting. Perhaps this is well, as it has given the members an opportunity of thoroughly studying the numerous plainly stated contentions and figures which the paper contains. The author has been frequently involved in appeals against impositions on the Denny undertaking, both for local and Imperial purposes. He is no believer in taking such impositions lying down; and his persistent effort during the past few years has been amply justified, as it has resulted in securing adjustments which have reduced the burden of rates and taxes to the extent of approximately £600 per annum. It is a pity that more gas undertakings do not take opportunities for appealing against their assessments, as under the modern conditions of trading in every gas-works there are modifications which should be made; and gas undertakings which do appeal are, on a properly presented case, usually successful in obtaining relief to their advantage and that of their customers. We think the paper will have a stimulating effect in this direction.

Mr. Simpson deals with the construction of a valuation point by point, illustrating it by the figures and experiences of Denny. Interspersed in the statement are comments which show how developments and current conditions have altered in a substantial way the factors which are adopted in the making of an assessment; but some assessors take up the conservative attitude of trying to stabilize obsolete instead of applying actual conditions. This is especially noticeable in dealing with tenants' capital and the question of coal stocks. The assessors ought to be well aware that, for the safety of a gas undertaking, and the assurance of the gas supply, it is now necessary to carry larger stocks than was the case at one time, and this not only through strikes, but through the vagaries of winter weather, and the flights of gas demand owing to the development of gas heating. There is the experience of the last coal strike, which has emphasized the prudence of carrying larger coal stocks. As a matter of fact, the conditions of conducting a gas business have altogether undergone considerable change. Then there are the still surviving controversial points regarding tenant's fixtures and movable plant. And again in connection with meters, cookers, and fittings the question may still arise, in arriving at the amount which the tenant is to be allowed for these items, whether present-day costs or prime costs should be taken. This matter is discussed by Mr. Simpson; and he shows that in 1924 a compromise was effected in the case of Denny between prices ruling at that date and pre-war values. That, as will be seen from the paper, was to the advantage of the undertaking. But it is probable that, at the expiration of the quinquennial period, the matter will be re-opened, with a view to securing re-valuation at present-day costs, instead of the artificial basis of present-day and pre-war costs, subject to fair allowances as representing depreciation to bring out the present value of the plant.

Many other matters are dealt with in the paper besides those to which attention is here directed. When the discussion takes place at the next meeting, there will probably be a good deal related as to experiences in respect of various items that are taken into consideration by Mr. Simpson—in fact, the paper throughout is an invitation to the expression of individual opinion regarding principles and their application.

Smokeless Fuel: Low-Temperature—

IN to-day's issue of the "JOURNAL," Mr. John Roberts concludes his highly interesting series of articles, commenced in the "JOURNAL" for July 4, on the production of smokeless domestic fuel. From the systems of low-temperature carbonization—of which there are legion—he has selected those which have achieved a certain measure of technical and commercial success; and his review of what has been accomplished by these systems, and his opinions regarding their possibilities, will be an admirable source of reference to our readers at a time when low-temperature carbonization processes appear to develop, like mushrooms, overnight, and when one constantly hears and reads about gargantuan plants being erected to deal with anything from stones to lignite. The review shows once again that there is woeful lack of proof of real commercial success, by which is meant the production of a satisfactory smokeless fuel, low in ash, with an economy which, in actual competition, would compare favourably with existing high-temperature systems. Regarding this, of course, low-temperature enthusiasts say that any comparison between gas coke and the "superior" smokeless fuel which they produce is ridiculous. Gas coke, they maintain, does not satisfy domestic requirements in the open firegrate. It will not ignite readily, nor, under ordinary conditions, will it continue to burn evenly when ignited; it has a high ash content; its radiant efficiency is much lower than that of low-temperature fuel; its virtue has been taken out of it during the high-temperature process—these are among the arguments used to decry the merits of high-temperature fuel. They apply in part to "bad" gas coke, prepared and handled without care, and marketed without efficiency. They have little application to the fuel which is now being produced by gas undertakings and coke ovens which have a thought for the morrow, and a desire to satisfy the demands of domestic consumers which extends beyond mere lip service. This fuel, which is pre-eminently suitable for use in domestic boilers, is capable of giving a radiant efficiency of 28 p.ct. in the open firegrate, and will burn well if the conditions of draught, depth of firebed, and insulation of grate are favourable. For open fire heating, however, where the conditions are unfavourable, admittedly it is not as satisfactory as coal in the ordinary firegrate,

though it burns perfectly well in specially designed coke grates, of which there are now several excellent types on the market.

And High-Temperature.

THE question arises, Can the gas industry, by a simple modification of the present high-temperature carbonization process, produce a smokeless fuel which will satisfy the householder's every demand in the worst circumstances—a fuel which will ignite more readily than the ordinary type of gas-works coke, will leave not more than a reasonable amount of ash, and will burn without attention in the common firegrate? Mr. Roberts certainly thinks this possible; and the concluding article of his series explains how it can be done without interfering with a gas undertaking's main object—the manufacture of gas. The process he describes—which, with the collaboration of the Woodall-Duckham Companies, and the co-operation of Mr. R. H. Ruthven, has been successfully tried at the Ramsgate Gas-Works—is suitable for static but not for moving charges. In other words, it is applicable to those works where horizontal retorts, intermittent verticals, or coke ovens are installed, but is not suitable for continuous verticals. Briefly, the idea is to blend non-coking with coking coal, and shorten the carbonizing period, leaving a small percentage of volatile matter (between 3 and 8 p.ct.) in the coke. The yield of gas per ton of coal carbonized is slightly less than in the normal method of carbonization, but this is compensated for by increased throughput per retort and a more saleable coke. Mr. Roberts terms the fuel "Homite," and says that it has been used in several types of grate, including the well and semi-well patterns, and has proved eminently satisfactory. "The conclusions to be drawn "from these trials," he observes, "are that free-burning "smokeless fuel can be produced under high-temperature "conditions in intermittent vertical retorts, while obtaining "yields of about 10,000 c.ft. of gas and 10 gallons of tar "per ton of coal. The fuel possesses the requisite proper-"ties of domestic fuel for use in open grates, being readily "kindled, having good combustibility, high radiant effi-"ciency, requiring little attention, and being, of course, "smokeless."

The Düsseldorf Carbonizing Plant.

IN our issue to-day is an illustrated description of the new plant at the Düsseldorf Municipal Gas and Coke Works. Erected in 1926, and brought into operation during the same year, the carbonizing plant has many interesting features. It consists of horizontal chambers, 26 in number, and each of a capacity of 10·8 tons. The heating of the setting is by clean, cold producer gas made in a central battery of extremely efficient revolving-grate units of the Koppers water-jacketed type. Taking into account the steam generated in the jackets, it is stated that the thermal efficiency is about 77 p.ct. The gas, after being washed, is stored in a holder, whence it is passed to the setting. Air and producer gas regenerators are fitted; reversal being effected by hand every half-hour. From the working results, it will be seen that, in terms of "pure" coke the fuel consumption for the setting is only 9·63 p.ct. by weight of the coal carbonized. It is difficult to appreciate why the fuel figure should be on the "pure"-coke raw-coal basis; but taking into account the moisture and ash contents of the coke, the fuel consumption amounts to only 11½ p.ct., which compares favourably with the 15 p.ct. which Mr. Thomas Hardie gives for horizontal retorts, and the 13 p.ct. for verticals equipped with waste-heat recovery ("JOURNAL," Carbonization Number, Feb. 14, 1928).

Readers will be surprised, perhaps, that with such a large carbonizing plant no mention is made of any attempt to incorporate dry cooling equipment for the coke; and they will certainly be intrigued that the plant is giving a gaseous yield of only 65 therms per ton of coal carbonized. This yield is doubtless influenced by the carbonizing method adopted—that of using a fifty-fifty mixture of gas coal and coking coal, with the object of producing a type of coke which has a ready sale for central heating purposes. The coke gives about 30 p.ct. of breeze—which is no small amount—and is a cross between a "gas-works" coke and a "coke-oven" coke. However, in spite of the low yield of gaseous therms per ton, the Düsseldorf Gas Committee are satisfied that they are efficiently and economically manufacturing in their "coke gas" works two main products which fully meet the demands of their respective markets. And when the A.G. für Kohleverwertung came along with their offer of a coke-oven gas supply from afar, the Düsseldorf authorities politely refused it.

Industrial Accidents.

ONE of the main considerations in connection with industrial operations is the avoidance of unnecessary sacrifice of life or limb, or loss of health; and it is to a large extent because of the assistance that they are able to afford in this direction that the Annual Reports of H.M. Chief Inspector of Factories and Workshops prove so valuable. It is to be wished that they could be even more widely studied than they are, if only for the evidence they provide of "how not to do things." While improved methods and additional precautions do their part in minimizing this wastage, the continuous speeding-up of life and the introduction of complications in industrial operations have a tendency to increase it. "Safety First," if it be regarded as a slogan, should be placed at the head of all slogans. It should form one of the earliest lessons at school; it should be a guiding principle through life. Not in order that it may make cowards of us, but that we may fulfil the duty cast upon us all, of thinking of ourselves because of others.

Much energy has of recent years been devoted to the spreading of "Safety First" principles. Yet what do we find on looking through the Chief Factory Inspector's report for 1927? Why, just the customary inclusion, with many unavoidable accidents, of examples of folly, which it would be extremely hard to exceed. The following case, which happened last year, is quoted as being typical of the usual attitude of the person who has not witnessed the results of being caught by shafting, or has not heard directly of a shaft accident. The occupier of a small saw mill had been for fifteen years in the habit of changing the speed mechanism of a saw by shifting by hand a belt only 1½ in. broad on a cone pulley, approaching the shafting for that purpose. Eventually the inevitable happened, and his coat wrapped round the shaft. He was whirled round; and the starting lever which he struck decapitated him—a ghastly object-lesson of the dangers of smooth revolving shafting. Heed must be paid to the assertion of the Chief Inspector (Mr. Gerald Bellhouse) that each succeeding generation of workers who enter industry must be duly impressed with the extreme risk of approaching any rotating shaft, however smooth and polished.

Mr. Bellhouse realizes that accident prevention is one of the big industrial problems which remains to be solved; and in view of the attention which is at present being devoted to the subject, he has dealt at somewhat greater length than usual with questions relating to it. For this, employers and employed alike will feel grateful to him.

The "Gas Journal."

IN succession to the late Mr. Arthur Bezant, Mr. Alfred Harrison has been appointed Editor of the "JOURNAL." Mr. Harrison's extensive knowledge of the gas industry has been gained by wide experience during 42 years on the "JOURNAL" staff. Upon the formation of Walter King, Ltd., at the end of 1921, Mr. Harrison became Assistant Editor, in which capacity he has thus spent over six years. During this period, and for many years before, he has been in close personal contact with the members of the gas profession; and his many friends in the industry will, it is felt, be happy to extend their support to him.

Mr. Norman S. Smith, B.Sc., who has been on the "JOURNAL" staff for nearly six years, becomes Assistant Editor. He graduated in Gas Engineering at Leeds University, and has had works experience with the Ossett Corporation Gas Department and with several engineering firms.

The general management of the business remains in the hands of Mr. Clifford King, who is now sole Managing Director.

The Family Spirit in Business.

There is great truth in the statement of Sir David Milne-Watson, in the course of an address before the Industrial Co-Partnership Conference at Oxford, that an industrial concern should be regarded as a large family, wherein all the interests are the same. How is this spirit to be attained and kept alive? Sir David believes—and he will be supported in his belief by all in the gas industry—that the best vehicle for accomplishing this is co-partnership. Certainly experience of co-partnership in the Gas Light and Coke Company, and in every other concern where it has been adopted, has shown that it engenders contentment among the workers, a spirit of comradeship between employer and employed, a greater sense of responsibility, and better all-round efficiency. Regarding objections to co-partnership schemes, Sir David observed that the one most commonly taken is that it makes trade unionists disloyal to their union. This objection has never arisen in the Gas Light and Coke Company, for no co-partner is asked whether he is a trade unionist; it is felt that co-operation in industry can best be promoted by organized labour and organized employers. Sir David's vigorous address is published *in extenso* in our columns to-day.

"Five Counties" Exports.

In our Editorial Notes last week, the Five Counties Scheme was summarized as an attempt to compete in the world market at the expense of the home consumer, charging the latter an uneconomic price in order to give the foreigner cheap coal. In mitigation, it was pointed out that the districts concerned were fighting for their lives; and so, in clemency and in hope for the future, we must not frown too heavily upon the latest news from the area. "The Times" of yesterday published a well-authenticated (as always) report from Leeds to the effect that the coal tonnage sold for shipment from Hull and other ports, for delivery between now and September, 1929, exceeds three millions. This total includes a million tons for shipment to Rotterdam; but its ultimate destination is believed to be Germany, in which case it would be the largest amount ever booked for that country. Progress is also reported against the Polish coalowners in the Scandinavian market, and strong hopes are expressed that before many months the Polish competitors will be left behind. Meanwhile, we turn to the Coal Trade Reports in this issue of the "JOURNAL," and read: "Export rules fairly satisfactory, with better prospects of forward shipment." But—"the heavy industries are not improving in regard to their fuel-using capacities; and the situation is engaging the most serious attention of the coalowners."

Gas and Atmospheric Pollution.

There are two types of atmospheric pollution. One is apparent; the other is invisible, but, because of this, none the less harmful. A chimney belching black smoke at once attracts attention; the same chimney, however, may unnoticed pour into the air vast quantities of oxides of sulphur, which play havoc with buildings and vegetation. Coal contains a good deal of sulphur, and smokeless solid fuels have about as much. Consequently, when electricity is generated by burning raw coal or pulverized low-temperature fuel, it means that the atmosphere is being polluted considerably for every unit of current produced. Gas, on the other hand, has an extremely small sulphur content; and when gas is substituted for coal, to evolve the same amount of heat the sulphur produced by the gas burned is about one-twentieth of that which would have been produced by the equivalent amount of coal. The effect of the increased use of gas in ridding the atmosphere of harmful acid constituents is indicated clearly in the Thirteenth Report on Atmospheric Pollution, which has been published for the Department of Scientific Research by H.M. Stationery Office, and an abstract of which appears in our issue to-day. It is shown that the increased consumption of gas in London since 1915 to 1926 has had the effect of reducing by 18,425 tons of SO_3 per annum the amount of sulphur which would have been poured into the air if an equivalent amount of coal had been burned. The corresponding figure for Glasgow is given as 1320 tons of SO_3 per annum. In a letter published in the "Yorkshire Post" on Friday last, a correspondent remarks on the "green smoke" evolved by the chimneys of the Manchester power station, and asks whether the Leeds power station at Kirkstall will also send out this sulphur smoke. "If so," he observes, "I pity the people who have to live near."

Town Gas from Brown Coal.

It is reported in "Das Gas- und Wasserfach" for June 30 that a contract has been made between the Braunkohlengas G.m.b.H. and the Municipality of Kassel for the addition to the existing gas-works of that city of a separate works for the production of gas from brown coal. This will be the first large-scale plant erected to deal solely and specifically with the production of town gas from brown coal, and is to constitute a serious attempt to perfect a really practicable process. The firms of Stettiner Chamotte-Fabrik A.G. vorm. Didier, of Berlin, and Dr. C. Otto & Co., of Bochum, both famous as makers of carbonizing plant, have combined to form the contracting Company, in which also the Deutsche Erdöl A.G. is interested. It is hoped to produce, from brown coal alone, a normal town gas, and to recover the bye-products in a marketable form. Construction has already begun, and it is intended to reach the production stage before the end of this year.

PERSONAL.

MR. JAMES MELROSE.

Hearty congratulations to Mr. JAMES MELROSE, who has been a Director of the York Gas Company for forty-five years, and who, in his native city York, celebrated on Aug. 5 the hundredth anniversary of his birth. On the previous day he received the following message from H.M. the King: "Knowing that on Sunday you will attain the age of 100, I desire to offer you my warmest congratulations. Yours has indeed been not only a long but a useful life of true citizenship and of devotion to your native and beloved city, which you have served in many and various capacities, including that of Lord Mayor. Your example of patriotism and zeal in well-doing will be an inspiration to the many who hold you in high esteem and affectionate regard, and to future generations of the city of York—George R.I." Other greetings were received from Viscount Lascelles and Princess Mary, the Archbishop of York, General Sir Charles Harington, the Duke of Portland, the Earl of Elgin, and many others. Mr. Melrose, in addition to being a Director of the York Gas Company, is a Director of the Yorkshire Insurance Company and also of Barclays Bank. He is a freeman of the city, and in 1877-78 filled with dignity and honour the office of Lord Mayor. For eighteen years he was a member of the Corporation, twelve of which he served as an alderman. Since 1867 Mr. Melrose has been a member of the York Racing Committee, and he succeeded to the Chairmanship in 1875, from which he resigned two or three years ago. For nearly half-a-century he has presided at the annual dinner of the Gimcrack Club, and has only once missed attending this gathering. He was present at a meeting of the Directors of the York Gas Company on Aug. 4; and after the business Mr. Alfred Procter, the Chairman, presented him with a solid silver rose bowl as "a tribute of admiration and affection on his 100th birthday."

Through the kindness of the Council of The Institution of Gas Engineers, Mr. WALTER T. DUNN, the Secretary, is taking an extended holiday in Norway and Scotland. He expects to be back in London on Sept. 10.

OBITUARY.

With deep regret we announce that MARGARET CHANDLER, wife of Mr. S. B. Chandler, the Distribution Superintendent of the Tottenham District Light, Heat, and Power Company, died yesterday morning at Milton Cottage, Bounds Green Road, N. 22, after an illness which had lasted for two years. Sincere sympathy is extended to Mr. Chandler.

Belgian Gas Association.

From the Quarterly Bulletin of the Association des Gaziers Belges we learn that their annual meeting was held in Brussels on June 20, with the President, M. Joseph de Brouwer, in the chair. The Association is an exceedingly keen and practical body, comprising two life members, five honorary members, 117 ordinary members, and 52 associates. For the present year, M. A. Henrion was elected President; MM. H. Van de Leemput and V. Timmarmans are Vice-Presidents; and M. M. Brabant is Secretary and Treasurer, in which capacity he is also largely responsible for the publication of the Bulletin.

ON THE ELECTRICAL SIDE.

As is usual, the report of the Senior Electrical Inspector forms a very readable section of the Annual Report of the Chief Inspector of Factories and Workshops for the year 1927. Mr. G. Scott Ram, O.B.E., M.Inst.E.E., is always able to offer useful hints to industrialists—as is the case with those who are responsible for every part of the report.

Accidents.

The number of reportable accidents notified during the year 1927 was 372, including 27 fatal cases, as against 338 accidents and 17 fatalities for the previous twelve months. This increase, however, is more apparent than real, being attributable to the figures for 1926 having been abnormally low, on account of slackness of work in the heavy industries due to the coal stoppage. It is, indeed, a remarkable fact, and one which Mr. Scott Ram thinks is directly due to the official regulations, combined with inspection, that the number of accidents is actually less than it was fifteen years ago, although during that period the generation and use of electrical energy has increased many times over. These notes of accidents are of value not so much on account of what is past as for the indication which they afford of what to avoid in the future.

Of last year's accidents, 28 occurred on high-tension systems; 22 being at stations of public supply or traction undertakings. Most of these accidents occurred to persons carrying out work other than routine operation at switchboards. In the case of seven of the accidents, the injured person was knowingly and deliberately taking risk in working on high-tension switchgear close to unprotected live conductors. In one fatal case, a highly technical and authorized person, wishing to examine the label on a current transformer in an outdoor switching station, climbed up the supporting gear, and came into contact with live conductors. In seven cases the accident was due to a mistake on the part of the worker or the foreman in thinking that the conductors were dead when they were not. In the case of 21 of the fatal accidents, the voltage of the shock would not exceed low pressure.

Lamps and Lamp Holders.

Portable hand lamps again accounted for several fatalities. In one case the lamp was of a type condemned annually in these reports for over twenty years, consisting of a brass fitting directly in connection with the lamp holder. In two instances an ordinary unearthed metal lamp holder on a flexible wire was being used for the purpose of a portable lamp. Fatalities through the use of lamp holders in this way occur with regularity every year. Few persons, it is said, appear to appreciate the risk which they run in using this handy and easily rigged-up device.

Three other fatalities were due to live lamp holders. In one case in a tannery, where the floor was always wet, insulated type lamp holders had quite properly been provided; but the engineer, finding that lamps had been stolen from the holders, had removed the protecting insulating skirts in order to attach a lamp lock in the form of a brass ring to the brass barrel of each lamp holder, so as to prevent the removal of the lamp. A lamp holder had become alive through leakage; and a man going to shift the position of the lamp received a fatal shock. In another case an ordinary metal lamp bracket with switch lamp holder not earthed was fixed over a lavatory basin where the floor was damp.

In one instance cited, some temporary lighting had been fixed up for the use of plasterers in a new building. In putting a lamp into a holder, one of them received a shock. Another man then turned off the switch, and an apprentice electrician tried to put the lamp in the holder and received a fatal shock. In this case, again, the lamp holder was not earthed; but the immediate contributory cause of the accident was the common practice of the ignorant or careless wireman in connecting the switch in the earthed wire of the circuit instead of in the phase wire.

The general adoption of lamp holders made entirely of insulating material in respect of the external parts would, Mr. Scott Ram says, go far towards eliminating this class of fatalities. Such lamp holders have been available for a number of years, and are widely used on factory premises for lamps on flexible pendants, as the trouble and cost of running a 3-wire flexible for earthing a metal holder is thereby obviated. Somewhat exacting qualities are necessary in the material used, which must also be capable of being moulded.

Unusual Fatalities.

A fatal accident occurred while some men were moving a portable conveyor in a salt works. The conveyor tilted up and struck some wires 15 ft. from the ground, cutting through the insulation. Two men were unable to let go of the spokes of the wheel which they were holding; and one was killed. The conveyor was constructed entirely of metal, and was being moved over a metal floor. Apparently salt cake on the wheels partially insulated it from the ground. The pressure of the circuit was 230 volts. Another fatality was of interest in showing how an extremely brief contact may have fatal results. A man in an ironworks was raising an iron rake, with which he touched a bare place in an otherwise insulated overhead conductor carrying 230 volts alternating. The contact could have been only momentary

Badly Constructed Radiators.

One fatal accident happened on a direct current circuit of 220 volts—a very rare occurrence. An electric radiator of a common but badly designed type was in use in a workshop having a tiled floor. Several men were sitting round it; and one of them, a normally healthy man 21 years of age, accidentally knocked it over on its back, with the result that the iron casing became live—his foot remaining upon it. One of his companions tried to raise his head, and, receiving a shock, immediately switched off the current. The man was then unconscious, and died six hours later. A post-mortem examination showed that, apart from conditions caused by the shock, the organs were normal and healthy. The duration of the shock was estimated at half-a-minute.

This accident, Mr. Scott Ram remarks, brings to light the dangerous construction of certain patterns of electric radiators commonly met with. It was of 3 KW. rating; the elements being in three sections. A switch at the base controlled two of the sections; the other being permanently connected across the terminals. The heating elements or coils were attached to fireclay slabs, at the back of which connections were made by bare wire; lengths of 8 in. being unsupported, and normally within $\frac{1}{8}$ in. of the sheet-metal back. It is obvious that a slight jar would bring these into contact with the back, and render the whole live. The terminals at the base and of the switch were unprotected, and could be readily touched. No sweating lugs for the cables were provided; and strands of the flexible cable at the terminals were liable to be in contact with the framework. A breakage of the fireclay fixing lugs, which would readily occur, and had actually done so, would also allow the live connections to touch the metal back. No earthing terminal was provided. Having a handle or hand-grip at the top of the casing, such radiators are clearly intended to be portable, and are liable to be moved about while in use—making it all the more necessary that safety should be properly considered in the design.

Development.

Each of the Electrical Inspectors reports a very marked activity in electrical development through his area. Several new generating stations have been completed and put to work, and others are in course of construction; while extensions have been made to many of the existing stations. On the other hand, several generating stations have been put out of commission for generating purposes, and have become sub-stations, taking a bulk supply for local distribution. More stations have been linked-up; and transmission and distribution mains have been extended into districts not previously served. The process whereby most of the existing generating stations will be shut-down in favour of a comparatively few capital stations, in accordance with the scheme of the Electricity Commissioners, is likely to be a main feature in the development of electricity supply for some years to come. As a corollary, the number of sub-stations for transforming or converting will continue to increase rapidly.

FORTHCOMING ENGAGEMENTS.

Sept. 5-7.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual general meeting in Edinburgh.

Sept. 19.—BRITISH COMMERCIAL GAS ASSOCIATION.—Meetings of the Executive and General Committees, in London.

Oct. 11.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Autumn meeting in Birmingham.

Oct. 22-24.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference at York.

THE INSTITUTION OF GAS ENGINEERS.

Sept. 10.—Emergency and Finance Committees and Benevolent Fund Committee of Management in the morning; Council meeting in the afternoon.

Sept. 18.—Finance and Executive Committees in the morning; Council meeting in the afternoon.

Oct. 8.—Emergency and Finance Committees in the morning; Council meeting in the afternoon.

Oct. 9.—Gas Education Committee.

Nov. 12.—Emergency and Finance Committees in the morning; Council meeting in the afternoon.

Nov. 13.—Executive Committee of Gas Education Committee.

Dec. 10.—Emergency and Finance Committees in the morning; Council meeting in the afternoon.

Dec. 11.—Executive Committee of Gas Education Committee.

HOLDER ACCIDENT AT THE BRADFORD ROAD GAS-WORKS.

Home Office Report.

The Home Secretary has received the Report of Mr. F. O. Stanford, O.B.E., M.Inst.C.E., one of the Engineering Inspectors of the Ministry of Health, whom he appointed under section 22 of the Factory and Workshop Act, 1901, to hold a formal investigation with regard to the accident which occurred at the Bradford Road Gas-Works, Manchester, on Aug. 23, 1927, when two of the gasholders were wrecked.

The inquiry was held in public at the Town Hall, Manchester, on Feb. 2 and 23, 1928. (A report of the inquiry was published in the "JOURNAL" for Feb. 8, p. 341, and Feb. 29, p. 559.) Evidence was given by representatives of the Manchester Corporation, by members of the staff of the gas-works, and by various experts and eye-witnesses of the accident.

Mr. Stanford found that the evidence pointed to the general conclusion that the crown plating of one of the holders failed. This allowed the gas to escape rapidly, the holder crashed down into its tank, and the escaping gas caught fire—probably through sparking from the tearing or falling ironwork. The failure of the adjacent holder is attributed to the resulting concussion and disturbance in the atmosphere. Fortunately no fatal consequences or serious injury resulted.

In considering the causes of the failure, Mr. Stanford points out that, so far as is known, there was no explosive gas or mixture of gas and air in the holders prior to the accident, and no explosion inside either holder took place, beyond possibly an explosion of a limited amount of gas remaining in the holder after the bulk had escaped and been fired in the open air. Had such an explosive mixture in fact been present, and an internal explosion taken place, much more devastating effects would undoubtedly have resulted. The accident cannot therefore be attributed to an explosion. Mr. Stanford also states that there was no evidence of any wilful malpractice or foul play; nor of any misconduct, such as smoking on the works, or the use of any unauthorized naked light. Nor does he attribute the accident to any fault of design or construction, though he points out that modern holders are somewhat differently designed.

The Report states that the gas-works are under the control of the Gas Committee of the Manchester Corporation; they were commenced in 1878, and the holders have been in continuous use since 1881. They had been examined externally twice a year, and any leaks found were stopped by means of external patches; but there had been no replating of either holder. Examination of samples from the material of the wrecked holders led to the conclusion that marked local corrosion, especially near the joints of the plating, had reduced the strength of the iron plates to a serious extent.

After considering whether any exceptional circumstances might have brought an abnormal stress on the structure, Mr. Stanford found no evidence of this character, and concluded that the cause of the accident was the weakened condition of the plating through corrosion, and the continued use of the holders under normal working conditions, when their safe working life had been passed. He recommends that the Corporation should appoint a Chief Engineer to take responsibility for the working and maintenance of their gas undertaking.

THE INSTITUTION OF GAS ENGINEERS.

Council Meeting.

A Meeting of the Council was held on Monday, July 16, at 28, Grosvenor Gardens, Westminster, when there were present: Mr. J. Terrace (President) in the chair; Mr. Chas. S. Shapley (Vice-President), Messrs. H. E. Bloor (York), T. Carmichael (Portsmouth), J. H. Canning (Newport, Mon.), W. E. Caton (Oxford), P. G. G. Moon (Bournemouth), R. Robertson (Bristol), H. C. Smith (Tottenham), W. J. Smith (Bolton), Frank P. Tarratt (Newcastle-upon-Tyne), J. Wesley Whimster (Bath), Ordinary Members of Council; W. W. Townsend (Colchester, Eastern Counties Gas Managers' Association), W. G. S. Cranmer (Short Heath, Midland Association), C. Valon Bennett (Rochester, Southern Association), D. Walter Davies (Tredegar, Wales and Monmouthshire District Institution); Chas. F. Botley and H. D. Madden (Past-Presidents); W. E. Price (Hon. Secretary); and Walter T. Dunn (Secretary).

Expressions of regret at absence were received from Messrs. H. E. Copp (Vice-President, Hull), R. E. Gibson (Ordinary Member of Council, Liverpool), W. Millar (Cookstown, Irish Association), H. H. Gracie (Edinburgh, North British Association), and John Wilkinson (Past-President).

The minutes of the previous meeting having been confirmed and signed, a letter was read from Mr. Moon regarding recording calorimeters, which was referred to the Calorimeters Committee for consideration.

Particulars with reference to the Royal Charter which is being applied for by the British Engineering Standards Association, were reported, and it was stated that a Sectional Committee for Gas would be included under the terms of the Charter.

A telegram which had been addressed from the Institution to H.R.H. The Prince of Wales (Hon. Life Member) on the occasion of his birthday was reported.

A letter was read from the British Commercial Gas Association with reference to the election of Mr. J. Terrace, who, in his capacity as President of the Institution, becomes first Vice-President of the Association.

A letter was read from the Czecho-Slovakian Society of Gas and Water Engineers, in which the Society conveyed its best wishes to the Institution, and the hope that the existing happy relations of the two organizations would be improved as time went on.

The deceases of the following were reported. The Council expressed their sympathy with those who had been bereaved:

Mr. P. V. Byrnes, of Hamilton, Ontario, President of the Canadian Gas Association (Hon. Member of the Institution).
Mr. J. Stewart Dougall, of Boston.
Mr. Levi Monk, of Hawick.
Mr. W. E. Walton, of Bishop Auckland.

With reference to the proposed Conference at Birmingham during the period of the British Industries Fair, February, 1929, a letter from Mr. R. J. Rogers, Hon. Secretary of the Gas Industry Section, was considered. It was suggested that arrangements should be made for a combined Conference of The Institution of Gas Engineers, the British Commercial Gas Association, and the National Gas Council, under the auspices of the respective Councils of these organizations.

A letter resigning his position as Chairman of the Board of Examiners was received from Mr. H. D. Madden, with much regret, and it was resolved that the cordial thanks of the Council be conveyed to him for the invaluable services he had rendered during the last five years as Chairman.

An invitation from the British Engineering Standards Association for the appointment of a delegate of the Institution to attend a Conference on the subject of Road Signs and Traffic Signals on Tuesday, July 24, was reported; and it was resolved that the President, Mr. Terrace, be nominated to serve in that capacity.

The Solicitor of the Institution, Mr. Shrimpton, attended and gave the latest information with reference to the Institution's application for the grant of a Royal Charter, and was instructed with reference to further steps.

Applications for membership were considered, and it was recommended by the Executive Committee that the following names be passed for including in the next ballot list to be issued:

APPROVED FOR THE CLASS OF MEMBER.

Harold Bunce Kendrick, Assistant Engineer, Gas-Works, Carlisle.
Herbert James White, Manager and Secretary, Gas-Works, Church Stretton.

APPROVED FOR THE CLASS OF ASSOCIATE MEMBER.

Thomas Brittlebank Armitage, Distribution Superintendent, Cheltenham Gas Company.
Arthur Sidney Brush, Manager, Gas-Works, Amble, Northumberland.
Frederick Thomas Buist, Technical Assistant, South Metropolitan Gas Company, Bankside Station.
Captain James Carr, Assistant Engineer and Manager, Stretford and District Gas Board, Stretford.
Harold Richard Hems, Chief Assistant, Industrial Heating Section, Birmingham Gas Department.
Thomas Mackie, Assistant Gas Manager, Gas-Works, Kelty.

A letter was read from Mr. F. C. Briggs, of Dudley, in regard to the re-organization of the Education Scheme, which would be necessary when the Royal Charter had been granted. The matter was referred to the Education Committee for consideration.

An application for the Institution to give its patronage to a proposed Heating and Ventilation Exhibition to be held in the new Horticultural Hall, in 1929, was considered, and was deferred for decision to the next meeting of the Council.

A communication was received from the Manchester District Institution of Gas Engineers, Yorkshire Commercial Section, with reference to the £150 which they had voted towards the expenses of the ammonia research, stating that no income-tax would be payable if this amount were credited to the Special Purposes Fund of the Institution, which had already been done.

It was reported that Mr. Dugald Currie, Engineer and General Manager of the South Shields Gas Company, had been nominated to represent the North of England Gas Managers' Association as District Member of Council for the year 1928-29.

SIR DAVID MILNE-WATSON ON CO-PARTNERSHIP.

An Address before the Industrial Co-Partnership Association, at Oxford, on July 27.

It is always a pleasure to me to come to Oxford, and it is a particular pleasure to have the opportunity of speaking on co-operation from the employers' point of view, because I think no one will dispute the gas industry's claim to have led the way in that very practical form of co-operation which we know as co-partnership. I am proud to recall that, in spite of the extension of the movement which we have been so pleased to note in recent years, gas still leads British industries in this respect.

My friend Mr. Frank Hodges will speak later on the same subject from what is called "the employees' point of view," and I hope that the result will be to show that in the end there is no real difference between the points of view of employers and of employees on this vital question.

The need for more effective co-operation and for "a more rational organization"—so the economic conference at Geneva put it—"a more rational organization of industry to secure a minimum waste of effort or material" has become the object of much public attention in the past few months, mainly owing to the conference between a representative group of employers and the Trades Union Congress in which I have been taking part. The first interim report of that conference and the prospect of the Trades Union Congress conference at Swansea in September have focussed public attention on this problem even more sharply. I believe there is a widespread feeling in the country to-day that more important than all our political or other differences is the urgent need to get the wheels of industry working more easily and efficiently for the production of our daily bread, to bring more prosperity to all ranks engaged in industry.

You will, I think, recall that perhaps the main point in the interim report of our Joint Committee is the need for better organization of both employers and employees, not for battle, but for co-operation and negotiation on the many problems affecting industry. It is with co-partnership as affecting this that I would like to deal.

Now I would never pretend that co-partnership is a panacea for all the industrial troubles from which this country is suffering at present. They are too diverse and deep-seated to be cured by any one remedy; and, frankly, I am suspicious of "cure-all" patent medicines. I do claim, however, that in its widest sense, including all that experience has taught us in the Gas Light and Coke Company to associate with it, co-partnership does mean a very big step towards effective co-operation. It does make possible, gradually, an atmosphere in which co-operation can become effective—an atmosphere of practical common-sense dealing with any causes of friction and with the day-to-day troubles incidental to any undertaking.

CULTIVATING THE FAMILY SPIRIT.

As a business grows larger and the number of workers increases from a few hundreds to many thousands, it naturally becomes more and more difficult for the men engaged in that business—employers and employed—to know each other personally. One is always told that in the old days an employer knew every workman—knew his christian name and all about his circumstances and his family. To-day, where thousands are employed, that is impossible. But as no man wishes or ought to be treated as a machine, it is absolutely essential that other means should be found to keep this personal touch alive; and this is what I claim can be, and is, effected by co-partnership.

The ideal I have always had in my mind in thinking of this matter is that a company should be regarded as a large family where all interests are the same; and as it is impossible to go back to the state of affairs in industry where, as I have already said, the employer knew personally every one of his men, it is necessary to provide other machinery to keep this family spirit alive. Co-partnership is the vehicle by which this end can be reached. In the Gas Light and Coke Company, centred round co-partnership are other schemes. We have pension funds, both for staff and non-staff employees; we have a benefit scheme; we have a distress fund; we have Works Committees; and we have a Sports Association. As these various schemes are largely in the hands of the co-partners, it gives them an opportunity of taking part in the activities of the Company.

I hope I have made it clear that co-partnership is a means of drawing all members of the Company closer to each other. It is essential, if a business is going to run smoothly, that there should be a feeling of sympathy and trust between the employer and the employed; and if they meet frequently at co-partnership and other committees, and at sports meetings, they can get to know each other better, and this brings about a thoroughly good understanding. For the employer to be just to the employed, it is necessary that he should know the employees' point of view; and for the employee to be just to the employer it is necessary that the employee should know the employer's point of view. Co-partnership is the easiest way of bringing about this desirable state of things.

LOYALTY ESSENTIAL.

What we want in modern business, as I have frequently said before, is a sense of loyalty to the business on the part of employers and employed. This has been deplorably lacking in the past, and is largely responsible for many of the troubles we are in as a country. Employers and employed should look to the interest and well-being of the business, and to its future as well as its present prosperity—to remember that it is a fatal mistake to expect always to get milk from the cow without seeing that she is properly fed and tended.

From what I am saying you will gather that the chief object in my view is to get a proper spirit into the business. But there are also material advantages. I remember some time ago talking to a well-known business man about our co-partnership scheme, and he turned to me and said: "You are trading on human selfishness, and trying to make your men happier by appealing to their self-interest." Well, why should we not appeal to their self-interest? After all, self-interest is one of the strongest forces in the world; and I venture to suggest that it will always have to be taken into consideration in human affairs. Why should men not be appealed to in this way? It is a deep-seated thing for a human being to desire to possess something of his own; and surely there is nothing more natural than to desire to have an interest in the business in which he is working and spending his life. The more interest a man has in the business, the more likely he is to be a successful employer or a successful workman. I believe this is one of the most important results of a co-partnership scheme when it has been in operation for some time. The men become interested in the well-being of the business; they desire to see it prosper; they are anxious to keep its end up when it is attacked; they are jealous of its honour—and I can put forward this claim after nearly twenty years' experience of work under a co-partnership scheme. I believe it also tends to make a man more careful in his work and to try to effect savings where possible.

I am not pleading for any special form of co-partnership, because I am sure that no one scheme is suitable for application to all businesses. There are, however, many different schemes of co-partnership in existence; and it is open to anyone to apply any of these, or one newly devised to fit the particular circumstances of his business. We in the Gas Light and Coke Company pay the men a bonus at the rate of the dividend on the ordinary stock. Last half-year it was £5 1s. 4d.; this half-year it is £5 10s. In that way co-partnership is linked up with the general prosperity of the Company. But the bonus can be calculated in any other way to fit in with the particular conditions of the business.

OBJECTIONS TO CO-PARTNERSHIP.

I think it would be useful if I were to try to deal with some of the objections to the application of co-partnership, rather than to discuss the details of various schemes. First, there is the objection of the trade unionist, who fears that co-partners will be apt to be disloyal to their Union—that co-partnership is a flank attack on trade unionism. Now this is an important objection, and must be met, because, as I have already said, it is by the co-operation of organized employers and organized labour that we feel that progress to prosperity can best be attained.

It is certainly true that the whole point of co-partnership is that it inspires a spirit of keenness and interest. No co-partner, however, is going to become so keen a dividend enthusiast as not to be an even greater enthusiast about any action by his Union likely to secure for him the highest wages and the best conditions that his particular company can afford in the given circumstances. Only his interests will be weighed one with another. And it must be remembered that I have included in my definition of co-partnership that whole altered spirit in all ranks which results from the close contact between them all through co-partnership. If co-partnership helps the employee to see the firm's point of view, it also enables the employer to keep in close touch with the employees' point of view.

What I will frankly admit is that the co-partner is less willing to be led into a strike—if things ever come to that—without careful consideration. But, after all, do we not all know that, like the arbitrament of war, great strikes and lock-outs are a barbarous and costly method of settling disputes which leave an evil trail of consequences behind them for everyone concerned? What we want is to find some method of round table conference, and settlement which will be speedy. Co-partnership helps to create the spirit in which such settlement is possible. It often supplies the machinery for securing agreement on questions which might have grown to big disputes.

The second objection which is put forward to this particular form of co-operation comes from some employers. Co-partnership, they say, is all very well for a public utility undertaking, protected from the full rigours of competition and with a moderate but steady dividend, but inapplicable, they allege, to semi-speculative undertakings. Well, I will not admit that there are any businesses to which the principles of co-partnership cannot be applied, though the application of the principles is no doubt easier in some than in others, and variations will be found necessary to suit particular cases. In almost all indus-

tries a well-forged link of co-operation and consultation between workshop and management will make for success and efficiency. Nor is it right to forget that we in the gas industry are to-day up against very severe competition from fuel oil and electricity; and I can assure you that co-partnership is a real help to us in meeting that competition, because the employees are keen on meeting it too.

I simply do not agree that co-partnership cannot be applied to businesses of a speculative or semi-speculative character. Take an industry like mining, which is to a certain extent speculative, inasmuch as it is dealing with a wasting asset, and there may come a time in the life of a coal mine when it would not be wise to invite the men to put their co-partnership bonuses into it. In this matter, the same thing applies to the men as to the employer whose money is sunk in that pit. If he is a wise man, he makes a sinking fund against the day when the mine gives out. There is no reason why a co-partner should not have his bonus also invested in a reserve fund outside the company. That would be only a cautious financial policy which there is no reason they should not share with the employer; and this also is a way of getting over an objection which is constantly being raised that small businesses cannot increase their capital so as to provide the co-partners with shares. While admitting that the schemes that are most successful are those which involve actual shareholding in the Company, a great deal can be obtained by a scheme which involves an interest in a reserve or sinking fund.

If I may venture to tread on delicate ground, I would like to add that the introduction of co-partnership in speculative or semi-speculative industry may be a very direct help to the management. It may help to correct a tendency not altogether unfamiliar to forget in sunshine the rainy days that may come.

When business is good is the time not merely to pay a better dividend, but to make adequate financial provisions for modernizing plant and for getting into a strong position to meet bad times which may come in the future. The growth of insurance has taught us that all sorts of risks may be spread, and sound finance can insure against a very large proportion of the risks of industrial depression.

Another objection put forward is that there is not enough money interest in it to make it effective and worth while. While I maintain that the spirit and the friendly atmosphere created by that spirit are really the important things, yet there is also material advantage. Suppose a man enters the Gas Light and Coke Company's scheme at the age of 20, and works for forty years, receiving an average bonus of £5 a year on his wages. If his money is left to accumulate, he will have £600 when he retires at 60. Is this no material interest? Surely, to accumulate that by the end of his working life is well worth while, especially if he is assured, as he would be in our Company, of a substantial pension? This £600 will enable him, when he has left the Company, possibly to buy a house, a little business, or, if he wishes, to go abroad. Is that not material advantage? Is it nothing? Is it not a material advantage that the co-partners in the Gas Light and Coke Company hold £700,000 of ordinary stock in the Company? It is useless to say that the men could have saved that money. The money, we know perfectly well, would not have been saved. It is extremely difficult for a young man at the beginning of life to see the necessity of putting by £5 yearly and leaving it to fructify. What a difference it would have made to the position of the men engaged in some of the other industries that are in difficulties to-day if such a scheme had been in operation during the years of their prosperity.

At this point, I should like to say that in our scheme, and in all schemes, the co-partnership bonus should always be paid in addition to the trade union rate of wages. In the short time at my disposal it is very difficult to deal fully with all the aspects of the question, but I hope I have said enough to show how deeply I believe in co-partnership, and more firmly than ever after twenty years' experience. In my belief, if a business is carried on from the point of view that efficiency is the prime concern, but that this efficiency must of necessity include contented employees and a practical understanding of their point of view and a decent and honourable humanity at all times, business need fear but little. And I believe that, if co-partnership in its many forms were only to be introduced generally throughout the country, it would be one of the principal means of bringing back in due course that prosperity and stability to our industrial life which we are all so anxious to see.

FACTORIES AND WORKSHOPS REPORT FOR 1927.

In his report upon the work of the Factory Department during the year 1927, Mr. Gerald Bellhouse (the Chief Inspector of Factories and Workshops) deals at somewhat greater length than usual with questions relating to accident prevention, since this is a subject which is receiving much attention at the present time, and is one of the big industrial problems that remain to be solved. He sets out in detail the developments which are slowly taking place, in the hope that the examples quoted may provide information to others who are studying the question, and may do something to stimulate that spirit of co-operation among all concerned which is essential to a solution of the problem. The report (which was issued recently by H.M. Stationery Office, Adastral House, Kingsway, London, W.C. 2, and Branches, at the price of 2s. 6d. net) thus forms particularly interesting reading. There is, too, another important matter dealt with at length—the opening of the Home Office Industrial Museum, which has already proved a great success.

Industrial Activities.

Though the majority of the industries of the country appear to have been steadily recovering from the disastrous results of the coal dispute of 1926, and the abnormal conditions which have prevailed during recent years, there has been a singular variation in the activities of certain trades—marked depression in some coinciding with phenomenal briskness in others. The number of registered factories has again risen slightly, from 145,411 to 147,501; while the registered workshops have dropped from 121,861 to 117,066. This change in the relative proportion of factories and workshops has, it is pointed out in the report, been going on now for many years. As a matter of fact, during the last twenty years factories have increased by almost 40 p.ct., while workshops have fallen by 26 p.ct. This may be taken as an indication that mass production in highly organized establishments is steadily replacing the workshop of the small employer.

Safety.

There was in 1927 a total of 156,974 accidents reported. This was an increase of 17,011 on the figures for 1926; while the fatalities rose from 806 to 973. In fact, 1927 shows a return to much more normal conditions than prevailed in the previous year. Seeing that so little had been accomplished on voluntary lines, and that the number of accidents reported to the Factory Department showed no signs of any substantial reduction, it was felt that the time had arrived for exercising the powers conferred by section 29 of the Workmen's Compensation Act, 1923, to require by Order special provision to be made to secure the safety of persons employed. Accordingly a draft Order providing for the establishment of a Safety Organization at each works was issued, applicable to the iron and steel trade, to the heavier side of the engineering industry, to iron foundries in which more than fifty persons are employed, and to shipbuilding. After discussion of the matter with parties interested, it was intimated that the Secretary of State would be prepared to hold up the Order for the time being in respect of any organization which would give an assurance that it would take up the matter energetically with its members. There has as yet been no time to obtain full information as to the results of these assurances; but reports already received show that, in a number of areas at all events, a start has already been made. Interest in the Order was shown by the number of individual firms applying for copies. Inquiries brought out the fact that a good many of these possessed some sort of Safety Organization, using the term in its widest sense as covering any system under which accidents are specially investigated by a person or by a committee. There is, however, said to be some evidence that in some cases at any rate the employees are not brought in to take their full share in the work; and the opinion is expressed that it is extremely doubtful whether good results can ever be obtained unless the interest of the workers is secured by bringing in their representatives to serve on the committees.

Unceasing efforts have been made to emphasize the fact that it is illegal to approach unfenced shafting when running at anything more than a dead slow speed. It is, however, remarked in the report that, to bring home the danger, education is necessary; and every succeeding generation of workers who enter industry must be impressed with the extreme risk of approaching any rotating shaft, however smooth and polished. As a result of the action taken by the inspectors, progress is reported in the fencing of lengths of overhead shafting, and in the adoption of belt shifting and lubricating devices which enable belts to be mounted and shafting oiled in safety by workers at floor level.

Eye Accidents.

In one factory, where a large number of brass finishers' lathes are used, the number of eye accidents caused by flying particles used to be very high. The firm was induced to fit transparent shields on hinged brackets over the lathe chucks. Since this was done, not a single eye accident has been reported. This safety device is among those shown at the Home Office Industrial Museum.

Light Oil Vapour Explosion.

An explosion of light oil vapour has been described by Mr. McNair, Engineering Inspector. It occurred while a set of

Hird continuous tar stills was being cleaned. The plant had been closed down at 9.30 p m. on a Sunday; and on the next day, when the stills were being scraped out by means of long iron scrapers inserted through the hand holes, an explosion took place on stills Nos. 2 and 3. The flames issued from the hand holes, and three men were seriously burned. It is supposed that the residual mixture of vapour and air was ignited by spontaneous ignition of carbon detached by the scrapers. The makers of the plant recommend that such stills should be steamed out at the end of an operation, and that sufficient time should be allowed for cooling before the stills are opened.

These precautions are also recommended by the Joint Committee of the Association of British Chemical Manufacturers, and the Association of Tar Distillers.

GAS-HEATED ENAMELLING OVENS, FURNACES, &c.

On the subject of gas-heated enamelling ovens, furnaces, &c., the report has this to say:

From time to time accidents are reported as having been caused by the explosion of gas-heated stoves, furnaces, &c. In many cases these accidents have resulted in fatal injuries to persons employed, and in addition much material damage often takes place. In the Midland Division alone, during the years 1925 and 1926, there were fifteen accidents caused by explosions of gas in stoves of various types—6 persons being killed and 20 injured, in some cases seriously. These explosions were due to various causes. In some instances explosive mixtures had formed in the stoves as a result of one of the burners going out, owing to low pressure of gas or through sudden draught, or by workers failing to turn out the gas properly when work was finished.

Following inquiries by the Engineering Inspector, the safety precautions necessary to prevent such accidents are summarized in the following notes, which were issued by the inspectors to the employers concerned.

Arrangement of Flues.—All flue outlets for carrying away the products of combustion of gas should be entirely unobstructed; and any valve in such a flue should be so constructed that it is impossible to reduce the effective cross-section of the flue to less than specified dimensions devised to prevent the burners from being extinguished through the products of combustion being unable to escape freely. The outlet of such a flue should not discharge direct into the main flue, but should be interrupted and discharge under a hood connected with the main flue at a point sufficiently high to prevent any operator from tampering with the flue so as to cause an obstruction. Such an arrangement of the flue prevents a down-draught in the main flue causing the lighting-back of the stove burners.

In stoves with double walls, in which the products of combustion are kept apart from the vapour produced by the drying of the articles, and where such vapour is in itself inflammable, proper flues should be provided to carry all such vapour directly to the open air, and away from any possible source of ignition.

Burner Arrangements.—Where the usual form of bunsen burner is employed, it is essential that these be fitted with control taps in a convenient position outside the stoves, and protected against accidental mis-handling, and that the air injectors of suitable design should also be fitted outside the stoves. The design of the air control and injector should be such that the primary air can be accurately controlled, thus making the burner draught-proof, as well as reducing the risk of the flame striking-back or blowing-out.

Burners should be fitted with inverted **V** cowls or channels running the whole length of the burner at a suitable height above the flame. This reduces the risk of accidental blowing-out, and also assists in lighting-up a long bar burner—the gas air mixture travelling rapidly along under the cowl. In some stoves containing several burners, part of each burner is carried alongside one of the others, so that any one which is blown-out is rapidly re-ignited by its neighbour. As this method is not always effective with atmospheric burners, the pilot gas jets may be of non-atmospheric type on small bore pipes running close to the main burners.

Gas holes either on burners or on pilot burner pipes should not be more than ¾ in. apart, so as to ensure rapid lighting.

Explosion Relief Valves.—In some stoves the openings at the bottom through which secondary air is admitted are made of considerable size, with a view to relieving the pressure produced by sudden shutting of the doors, and so preventing the burners from being blown-out. This arrangement, although effective, and also likely to minimize structural damage caused by an explosion in the stove, is sometimes unsatisfactory on account of the loss of thermal efficiency due to the large excess of air passed through the stove. To obviate this, hanging flaps may be fitted to reduce the volume of air passed, while affording relief in case of explosion. They should be placed preferably at the sides or back of the stoves. In any case, all stoves and ovens should be raised at least 1 in. above floor level.

The adjustment of burners and of air supply, and the lighting of the burners, should be done by one responsible person; and no person whose clothing is liable to be wet with inflammable liquid should be allowed to approach such ovens.

Air Blast Apparatus.—In cases where air under pressure is used in conjunction with low-pressure gas, as in certain forms of gas furnace, a back-pressure valve should be fitted on both air and gas mains. This device is not intended to arrest an explosion, but to prevent the formation of an explosive mixture through the air passing into the gas main as a result of the stoppage of the burner.

EXAMINATION OF TAR STILLS AND SIMILAR VESSELS.

There is a section relating to dangerous trades; and under the heading of chemicals, it is remarked that the chief difficulties encountered have been connected with the examination of tar stills and similar vessels. While many firms have adopted the recommendations of the Joint Committee of the Tar Distillers' and British Chemical Manufacturers' Associations in their entirety, observing precautions which go considerably further than the minimum requirements of the regulations, there are still a good many plants where breaches of the regulations occur every time a still is opened-up for cleaning. The cleaners themselves are not allowed to enter the vessel until it has been certified as safe; but the man appointed as a responsible person does not always realize that he is breaking the regulations by going in himself, as a preliminary, to examine for dangerous gas by means of his sense of smell. In some places the foreman had done this for years before the regulations were made; and in the smaller works there is often no superior official who can exercise adequate supervision over such a man with his long practical experience. Stills are only opened-up at long intervals; so it is very rarely that an inspector can have the opportunity of seeing personally what happens on such occasions. The fact that the regulation is broken at those times is either admitted or can be deduced from the absence of facilities for any other test. These foremen are now beginning to realize the magnitude of the risk they have been taking in the past; and provision is being made for satisfactory tests.

A new short-period (half-hour) self-contained breathing apparatus known as the "Salvus" has been submitted for test and approved for use under the Chemical Works Regulations.

LIGHTING.

With regard to lighting, it is gratifying to note that the work of bringing to the notice of employers the recommendations of the Departmental Committee on Lighting in Factories and Workshops has been continued. Two members of the staff were again detailed to take readings in various industries during the winter months. This work serves a double purpose, in that it rouses interest in the subject and proves the feasibility of setting up a legal standard of lighting for any particular industry or process. Not only do more people appear to take an interest in the question, but there are signs of a much wider grasp of the principles of good lighting. It seems, says the report, that the concentrated propaganda carried out recently by the more scientific illuminating engineers and others has filtered through to the man at the works who is responsible for lighting conditions. Many of the trade pamphlets contain highly instructive material on lighting matters. At several factories the inspector has been shown copies of these pamphlets, and has found experiments on proper light distribution in progress. The engineer of one large cotton mill stated that the firm had recently provided him with a photometer in order to arrive at some uniformity in the amount of light distributed throughout the mill; while other engineers in charge of lighting have said how much they would appreciate the use of a photometer when arranging light sources. The chief problem in many departments of textile factories is that of obtaining equality of illumination on the whole length of the very large machines.

Mending or darning of cloth requires specially good light; and of eight readings taken, all were above the 5 foot-candles standard, while four gave over 20 foot-candles. One firm had gas lighting specially installed for very fine mending, as it is preferred to electric light, although the amount of illumination obtainable is much less. Anything over 6 foot-candles is considered sufficient. There were 173 readings taken in cotton mills, on processes for which a standard of 3 foot-candles would probably be recommended; and 109 were below this figure. In woollen mills, on processes for which a similar standard has been recommended, 52 readings were taken; and of these 20 were below 3 foot-candles. The investigation by the second inspector in connection with certain other industries embraced 27 readings. Of these industries, the standard of illumination was found to be highest in the boot and shoe trade; only four of the readings taken being under the recommended standard of 3 foot-candles. There were 54 readings of 5 foot-candles and over; while 18 exceeded 20 foot-candles. The standard was found to be low in the engineering trade, where of 124 readings taken, 25 were below 3 foot-candles. Taking these readings as a whole, the standard employed is at least 30 p.ct. below that recommended by the Committee on Factory Lighting—not through any inadequate quantity of illumination, but through faulty distribution of the light sources, accompanied by insufficient shading.

However, reports from all quarters show that the question of lighting is receiving more and more attention, and that improvement, though gradual and slow, is very noticeable—especially if a comparison is made with the conditions obtaining only a few years ago. Painting of walls white in dark rooms

—especially in proximity to machines—has often a remarkable effect on the light. Mention is made once more of defective lighting of dangerous machines.

PITCH AND TAR WORKERS AND CANCEROUS GROWTHS.

The report of the Senior Medical Inspector states that the figures for epitheliomatous ulceration cannot be regarded with equanimity. The fatalities account for more than half the total fatalities from all forms of notifiable industrial disease. The importance is emphasized of men presenting themselves for examination periodically when an abnormal growth on the skin appear.

Of the cases due to pitch and tar, 14, with one death, occurred in tar distilling plants, and 14 with five deaths, in gas-works. Voluntary periodic medical examinations have been instituted during the year at six gas-works, four tar distilling plants, and two coke oven plants. Several surgeons comment on the reluctance of the men to submit themselves to examination, even, in one instance, where the firm gave the men the opportunity of going to the surgeon's house, so as to ensure private examination. At a large gas-works, the surgeon does not conduct periodic examinations, but visits the departments fortnightly. He relies on his persuasion and on notices posted in the works to get the men to report. The system, he states, is working well, and is distinctly encouraged by having all early cases treated by radium, thus overcoming the natural reluctance of the employees to undergo surgical treatment. Only one out of 56 cases during 3½ years resisted treatment and required excision; and only two cases of failure to disclose warts have come to the surgeon's notice.

In two years, at a tar distilling plant, 15 cases of warts showing evidence of ulceration and epithelioma, and nine cases of pre-cancerous warts, were disclosed. At another similar works, at the first complete examination in 1924, two definite cases of epithelioma requiring immediate operation were revealed, out of 100 men examined. Voluntary reporting by the men was subsequently tried; but at the beginning of 1926 two further cases occurred, the men not reporting until the disease was well advanced. A second examination was then made, and two further cases of epitheliomatous warts were found. The examination is, in future, to be carried out at regular intervals.

COAL GAS POISONING.

Thirty-eight cases, with two deaths, occurred from coal gas poisoning—23 of these from leaking joints or faulty jets.

Ten women were affected in a weaving shed. The lamp bracket of a ceiling light had been abstracted by some person unknown, so that when the gas was turned on from the main an escape occurred into the shed. Another accident of a somewhat similar character was caused by failure to shut-off the lighting valve at night, so that the gas continued to escape throughout the night into the weaving shed. In the morning the error was discovered; and, although steps were taken to ventilate the shed, within half-an-hour of starting work five women were affected. Four women were also affected in a shed where the gas escaped from a pipe running across the gutter between the windows, which had become corroded. The pipe being encased in wood, the corrosion had not been observed.

The two fatal cases were men found dead in valve pits. In one instance it was presumed that the deceased went into the pit to recover his ruler, which was found beside him in the pit. In the other case, there was no evidence to show how the man got into the pit; but it appeared that he had entered in order to test for the presence of liquor, and in so during had turned on the valve. On each occasion the man was alone, so that his absence was not detected for some time. Entry into such pits without breathing apparatus is attended with great risk, and should not be allowed unless a second man is present to give assistance if necessary.

ATMOSPHERIC POLLUTION.

Report of the Department of Scientific and Industrial Research.

There has been published by H.M. Stationery Office, Adastral House, Kingsway, W.C. 2, at 6s. 6d. net, a report by the Department of Scientific and Industrial Research on atmospheric pollution during the year ended March 31, 1927. It forms the thirteenth report on observations of atmospheric pollution, and is in continuation of the series of reports of the Advisory Committee on Atmospheric Pollution issued by the Meteorological Office.

REORGANIZATION.

Formerly, the Government's share of the work was carried out under the general supervision of this Committee, assisted by a Technical Sub-Committee of scientific experts. It consisted in the supervision and co-ordination of the observations made by the various authorities who maintain gauges and other appliances at their own cost, the presentation of the results in an annual report, and—within the financial resources available—the conduct of researches into the nature of atmospheric pollution and the best methods of measuring it. One of the objects at which the Advisory Committee have aimed has been the development of the research side of the work; and to this end the transfer to the Department of Scientific and Industrial Research of responsibility for the Government's share in the work was approved. The Department, acting through Dr. J. S. Owens, who has placed his services at their disposal as Superintendent of Observations, will continue the co-ordination of local records, and will prepare an annual report. Special researches directed towards the solution of the scientific problems of atmospheric pollution will be initiated and carried out by the Department. They will come within the administrative responsibilities of the Director of Fuel Research, Dr. C. H. Lander. The results of these researches will be incorporated with the results of the observations in the annual reports prepared by the Department.

A FEW OF THE FINDINGS.

The report under review describes work carried out prior to the reorganization, and which was, therefore, still under the direction of the Advisory Committee on Atmospheric Pollution. The deposit of impurity at 80 different stations in the United Kingdom is considered. A classification is made according to standards of increasing quantity of deposit denoted by the letters A to D in order of quantity of pollution. It is shown that from 1914 to 1927 the number of stations ranking as A and B has increased from 54 p.ct. of the total in 1914-15 to 87 p.ct. in 1926-27. On the other hand, stations ranking as D show little improvement, the percentage at the beginning and end of the period being 4. Tables are given setting out the results from different aspects. In Table 1 of the report the highest and lowest deposits for the year are given; and it is shown that the tar deposit during 1926-27 was highest at Burnley, and lowest at Southport (Hesketh Park). Carbonaceous or sooty matter made its highest deposit at Newcastle-on-Tyne; the lowest being at Rothamsted. The highest deposit of sulphates was at Burnley, the lowest at Southport (Hesketh Park). Table 5 of the report gives the relation of the different components to the total pollution for London, Newcastle-on-Tyne, Malvern, and Leeds in summer and winter. It shows a wide variation in the composition of the deposits. For example, in Newcastle-on-Tyne the sooty matter formed from 20·6 to 43·6 p.ct. of the total, while at Malvern it formed only 3·3 to 8·6 p.ct. The deposit of sulphates at Newcastle-on-Tyne was from 5·9 to 12·8 p.ct. of the total, while at Malvern it formed 21·9 to 35 p.ct.

RELATION OF SULPHUR TO TOTAL DEPOSIT.

In the Eleventh and Twelfth Reports of the Committee, the relation of sulphur to other deposits was discussed, and the amount of sulphates was compared with carbonaceous matter and total solids. A tendency was shown for the sulphur deposit to vary inversely as the total, when different places were compared, but not in all cases. Similarly, an inverse relation was shown to exist between the percentage of carbonaceous matter and that of sulphates in the deposits; this latter being probably due to the effect of dilution of sulphur contents with carbonaceous matter. It has often been stated that the abolition of smoke would leave the air as much polluted by sulphur as before, since the sulphur in coal is emitted as a gas, and the quantity bears no relation to the amount of smoke. This might be true provided smokeless fuel, which contained the same amount of sulphur, was substituted for coal. Such substitution has not occurred. There has, on the other hand, been a great increase in the quantity of coal gas consumed for heating and cooking, and this has a profound effect upon the amount of sulphur emitted. Roughly speaking, when gas is substituted for coal, to evolve the same amount of heat, the sulphur produced by the gas burned is about one-twentieth of that which would have been produced by the coal.

In Table 6 of the report the total impurity deposited, and the sulphates as percentages of the total impurity, are shown for London and Glasgow for the years 1915-16 to 1926-27. The London figures indicate that there has been a fairly steady reduction in the amount of total solids deposited, and a corresponding reduction in the percentage of sulphates; but the sulphates have reduced more than the total impurity. The fact that the actual quantities of sulphates deposited have diminished is also important. In 1915-16 the total annual deposit was 2829 metric tons per 100 square kilometres. This fell to 959 in 1921-22, the year of the great coal stoppage, which commenced on April 1, 1921, and did not terminate until July 4. After 1921-22 there was an increase in the deposit of sulphates, and since then up to the year under review it has been fairly constant, between 1200 and 1600, so that when expressed as a percentage of total deposit the figure has been between 12 and 13 for the five years 1922-26.

With regard to the figures for Glasgow, the percentage of sulphates has fallen from 22 in 1915-16 to 15 in 1926-27, and

there has been a fall in the actual quantity of sulphates deposited from 3611 metric tons per 100 square kilometres in 1915-16 to 1667 in 1926-27. Here again there has been a very definite reduction in the sulphur impurity in the air. As in the case of London, the lowest deposit of sulphates was in 1921-22—1341 metric tons per 100 square kilometres. Since then the quantity has not varied very greatly.

Looking at the relation between the London figures for total solids and sulphates, and comparing the highest and the lowest deposits—that is, 1915-16 and 1923-24, or 16,225 and 11,257 respectively—the latter figure is 70 p.ct. of the former. In the case of the sulphates the two figures are 2829 and 1296; the latter being 46 p.ct. of the former. Thus the sulphates have diminished more rapidly than the total impurity.

Considering the Glasgow figures in the same way, the highest total solids are in 1917-18—17,466—and the lowest in 1922-23—9925—the latter figure being 57 p.ct. of the former. The sulphate deposit for the same two years was 3299 and 1498 respectively; the latter figure being 46 p.ct. of the former. Here again the sulphate deposit has fallen more rapidly than the total deposit.

EFFECT OF INCREASED USE OF GAS.

It appeared possible, states the report, that a relation might be found between the increase in the quantity of coal gas used and the reduction of sulphur in the air. It may be assumed that the quantity of sulphur impurity in, or deposited out of, the air varies directly with the amount of sulphur being poured into the air, other things being equal. As the chief source is the burning of raw coal containing, perhaps, an average of 2 p.ct. of sulphur, the substitution for such of coal gas containing only 30 to 40 grains per 100 c.ft. should have an important effect.

We may consider the sulphur contained in fuel in terms of its calorific value, which appears a useful way of comparing the fuels as to sulphur production. Looked at in this way, raw coal contains per 100,000 B.Th.U.—*i.e.*, per therm—540 grains of sulphur for each 1 p.ct. of sulphur present in the coal, or an average of about 1080 grains per therm, while coal gas contains for the same number of B.Th.U. 60 to 70 grains of sulphur.

If we take, therefore, the increase in the quantity of gas burned in a city in a given time, this gas has presumably replaced raw coal, and the amount of raw coal so replaced would have produced a definite quantity of SO_3. The gas which replaces it would produce a smaller quantity, and the difference between these two should give us the reduction in sulphur due to gas. This assumption is not strictly true, as owing to the higher efficiency of gas apparatus more coal would be replaced than a corresponding number of heat units would indicate.

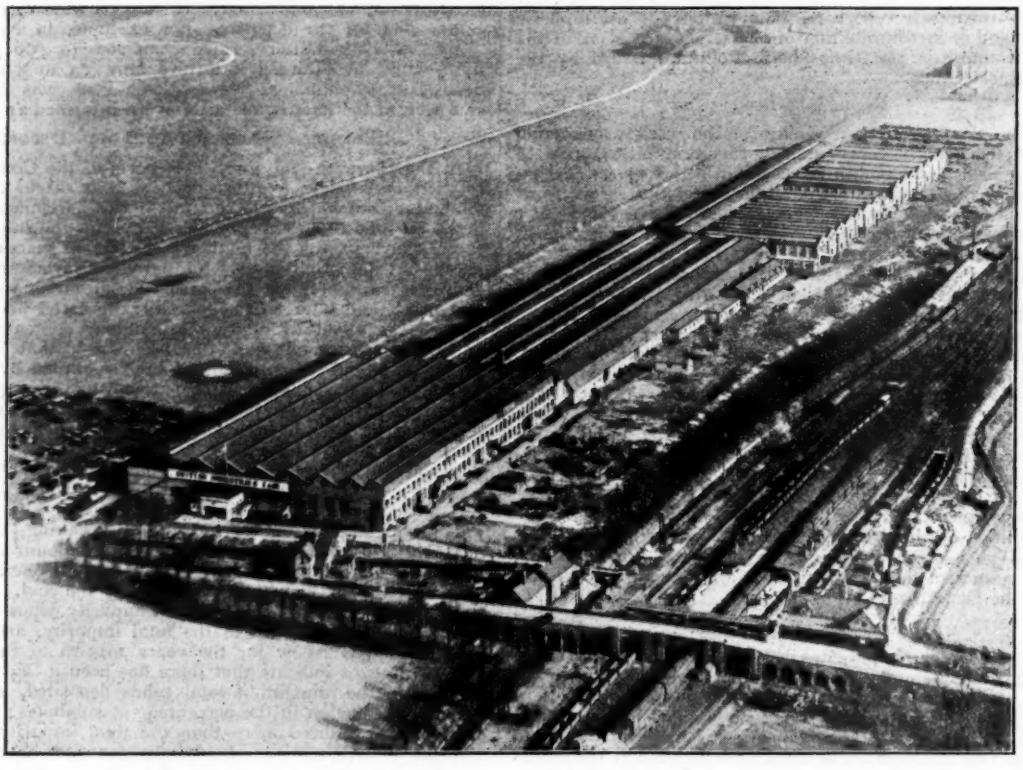
The gas produced by the three great Gas Companies in the metropolitan area in 1915 was 45,781 million c.ft. In 1926 the quantity was 67,380 millions, showing an increase of 22,599 millions. Taking the calorific value of this as 500 B.Th.U. per c.ft., it represents 11,300,000 million B.Th.U., or about 390,000 tons of coal taken at 13,000 B.Th.U. per lb. Assuming this coal to contain 2 p.ct. of sulphur, it would have had a total of about 7800 tons, whereas the gas actually burned instead—*i.e.*, 22,599 million c.ft.—would have contained about 430 tons, showing a reduction due to the use of gas of 7800−430=7370 tons, which represents 18,425 tons of SO_3.

In the case of Glasgow, the gas used in 1915 was 8343 million c.ft. In 1926 it was 10,003 millions, showing an increase of 1660 millions. Assuming (which is not strictly true) that this displaces coal of the same calorific value, the coal so displaced would be approximately 28,000 tons. The gas, when burned, evolves about 32 tons of sulphur, while the coal would have produced 560 tons. Thus the reduction in sulphur due to increased use of gas is approximately 528 tons during the year 1926 as compared with 1915. This represents 1320 tons of SO_3. This result is unduly favourable to coal since, as pointed out above, more coal would be replaced by gas than the assumed quantities.

Section 2 of the report deals with the suspended smoky matter in the air and its hourly variation. A curve shows the effect of the coal stoppage of 1926 at Stoke-on-Trent. While in London there was no appreciable effect on the amount of smoke pollution, there was improvement at Stoke-on-Trent.

BRITAIN'S TEN-ACRE FAIR UNDER ONE ROOF.

An Air Photograph of the Greatest Exhibition Hall in the Country.



New air photograph, showing the immense area of the British Industries Fair, Birmingham, after the series of permanent extensions, at a cost approaching £100,000, made necessary by the ever-growing demands of manufacturers for space. The most recent of these extensions, giving a further 130,000 sq ft of exhibition space, brings the Fair in Birmingham up to a total of 400,000 sq. ft, all under one continuous roof—certainly the largest exhibition hall in the country. As every foot of this space was employed for the ninth display of heavy goods and hardware last February, it is probable that still further extensions will have to be considered in the immediate future, to meet the larger reservations being made by many firms, and to provide for new comers booking for 1929. Other features shown in the photograph are: (1) One of the great car parks; (2) the proximity of the Fair to L.M.S. main line station, with special access to the exhibition buildings; and (3) the Fair's private siding for rapid handling of goods for display.

THE "COKE-GAS" WORKS AT DÜSSELDORF.

During the past year, members of the Commission de Fabrication of the Association Technique de l'Industrie du Gaz en France visited the Municipal Gas and Coke Works of Düsseldorf, and were greatly impressed with the plant in general, and with the practice of manufacturing an "intermediate coke." They consider, indeed, that the station may be looked upon as the prototype of the "Cokerie Gazière." For the loan of the blocks illustrating the account, we are indebted to the Editor of the "Journal des Usines à Gaz."

The municipal gas-works of Düsseldorf supply gas to a population of 480,000, through 98,000 services. The annual output is 60 million cub.m. [2119 million c.ft.]. The A.G. für Kohleverwertung found that their advances met with no success; Düsseldorf maintaining that a coke-oven supply was just as expensive as their own gas, and that to take it meant sharing the risks of excessive centralization. The Düsseldorf gas-making plant includes horizontal and vertical retorts, horizontal chambers, and an out-of-date water gas installation which is to be replaced by a modern Pintsch plant. Actually, however, only the horizontal chambers and the water gas plant are in use, as these are considered the most economical. The works give employment to some 200 hands, whose wages vary from 0·8 to 1 mark an hour [the stabilized mark approximately equals one shilling], and the district staff is also about 200. Tar is not worked-up *in situ*, but is sent to the Rutgers Works at Duisburg; but ammonia is recovered in the form of sulphate.

Central Producer Plant.

The horizontal chamber bench is heated from a central battery of Koppers producers, five in work and one in reserve, each capable of gasifying 10 to 14 metric tons of coke per day, according to the grading employed. Normally the coke contains 12 to 14 p.ct. of ash and 9 p.ct. of water; and the yield of producer gas averages 4·5 cub.m. per kg. [72 c.ft. per lb.] of a net calorific value of 1150 cal. [129 B.Th.U.]—analysis as follows: Nitrogen, 54 p.ct.; CO_2, 5 p.ct.; CO, 28 to 29 p.ct.; H_2, 11 to 12 p.ct.; CH_4, 0·4 p.ct. The thermal yield amounts thus to 76-78 p.ct. of the heat units in the coke, a high value which probably includes something for the steam. The lower part of the producers is water-jacketed; and there 1 kg. of steam is raised per kg. of clean dry coke gasified—half the steam being used in the plant itself, and half blown away. Two men per shift of 8 hours suffice; all the controls being centralized on the upper stage.

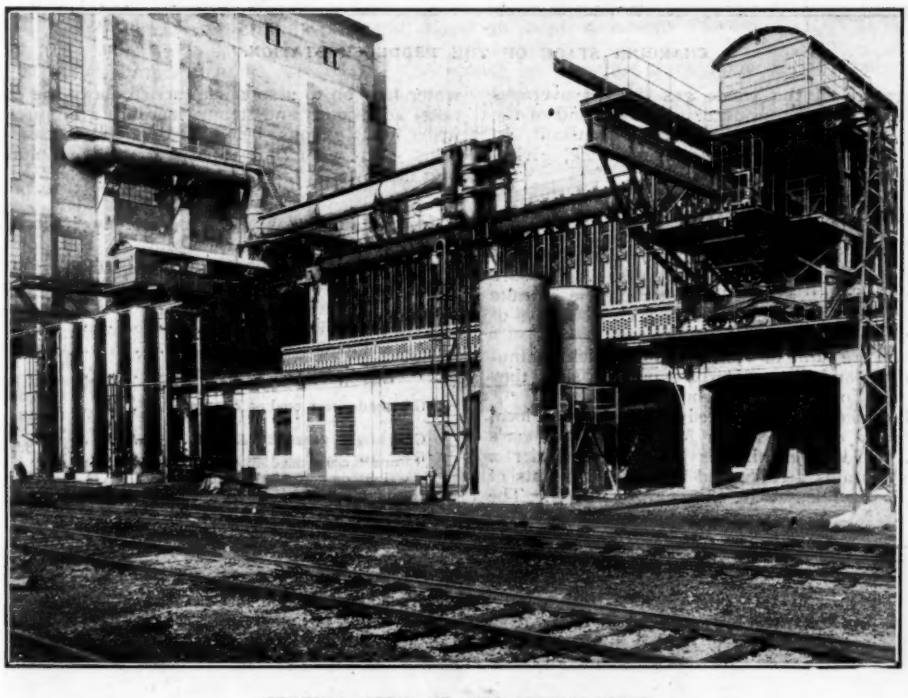
The Koppers producers have mechanical rotary grates, and an internal diameter of 2·1 m. [nearly 7 ft.]. Charging is effected by means of a rotatable chute, which spreads the charge to the best advantage on the fuel bed. Smalls and breeze are not mixed in the charge, either one or other being used entirely, so as to assure even resistance in the producer. It is claimed that the Koppers method of charging towards the periphery of the fuel bed obviates the formation of a central cone and consequent overheating and clinkering of the sides.

The gas is washed and cooled in a water-spray condenser, into the bottom of which it enters at a temperature of only 300° C. (which may account for the high yield claimed): The gas is cooled here to 30° to 35° C. A sludge of oxide of iron and carbon collects in the base of the apparatus. At this point there still remains some dust in the gas, but insufficient to interfere with the working of the fan, which incidentally is interlocked with the producer blower so as to avoid risk of an explosive mixture accumulating. The tar and dust are finally separated after the fan, and the gas passes to a 1000 cub.m. [35,300 c.ft.] holder.

The Chamber Ovens.

Each of the 26 chambers measures 11 m. by 3·5 m. by 0·4 m. [36 ft. by 11 ft. 6 in. by 1 ft. 4 in.] and has a capacity of 11 metric tons [10·8 tons], normally made-up of 50 p.ct. washed coking smalls and 50 p.ct. of large broken Zollverein gas coal, an average analysis of which shows: Water 7 p.ct., ash 8 p.ct., volatiles 28·5 p.ct.

The gross calorific value of the oven gas was given as 5100 cal. per cub.m. [573 B.Th.U. per c.ft.], and this is diluted with water gas to 4500 cal. [506 B.Th.U.] for distribution. The total daily production of rich gas is about 120,000 cub.m. [over 4¼ million c.ft.]. As coking and gas coals are not treated separately at the works, the result is claimed to be an intermediate product eminently suited to central heating purposes. The coke gives some 30 p.ct. of breeze.



GENERAL VIEW OF THE INSTALLATION.

Seventeen-hour charges are worked, but these are varied to control the output. Eight men per shift are required on the bench.

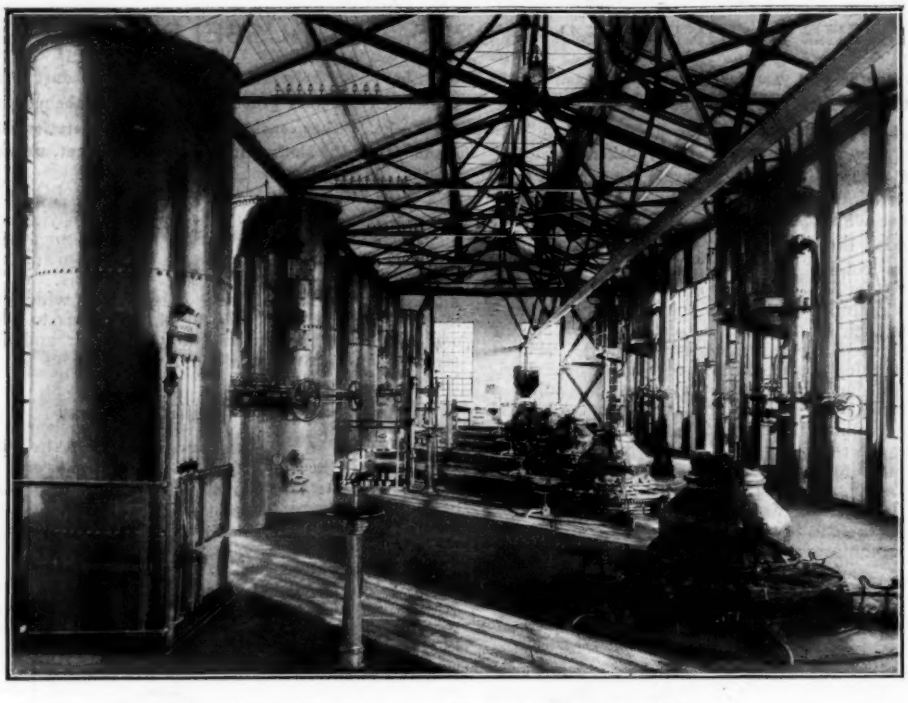
Coal Handling.

Coal is received at the works by rail, where the wagons pass over an automatic recording and foolproof weighbridge. The coal is then raised by Hunt conveyors to a tower of 1000 tonnes capacity, sufficient for three days' consumption. In the tower is situated the breaking and mixing plant.

Working of the Bench.

The coal charge is again weighed when it reaches the coal car on the charging stage floor, an ingenious balance arrangement taking the whole weight of the car from off the rails.

The settings themselves are of the Koppers compound type; but actually no rich gas is used for their heating. Air and producer gas regenerators are fitted, and reversal is made roughly every half-hour. It is interesting to note that mechanical control of this feature has been abandoned for hand working, owing to mechanical difficulties. A continuous record is



CHARGING STAGE OF THE PRODUCER STATION.

kept of the temperature of the waste gas flue (it averages 200° C.), of the pressure in the producer gas duct, and of the pull on the setting; and to maintain the latter constant, an "Arca" regulator has been at work for some time, giving absolute precision and great satisfaction.

The coal and coke cars and the discharging apparatus are duplicated for security's sake. Ordinary lutes were fitted to the discharging doors, after experiments had been made with asbestos. The latter would have cost 30,000 marks for the bench, and showed no compensating advantages. A pressure of 3 mm. is maintained by "Arca" regulator on the off-take main, in which the gas is cooled to about 80° C. by sprays of ammoniacal liquor.

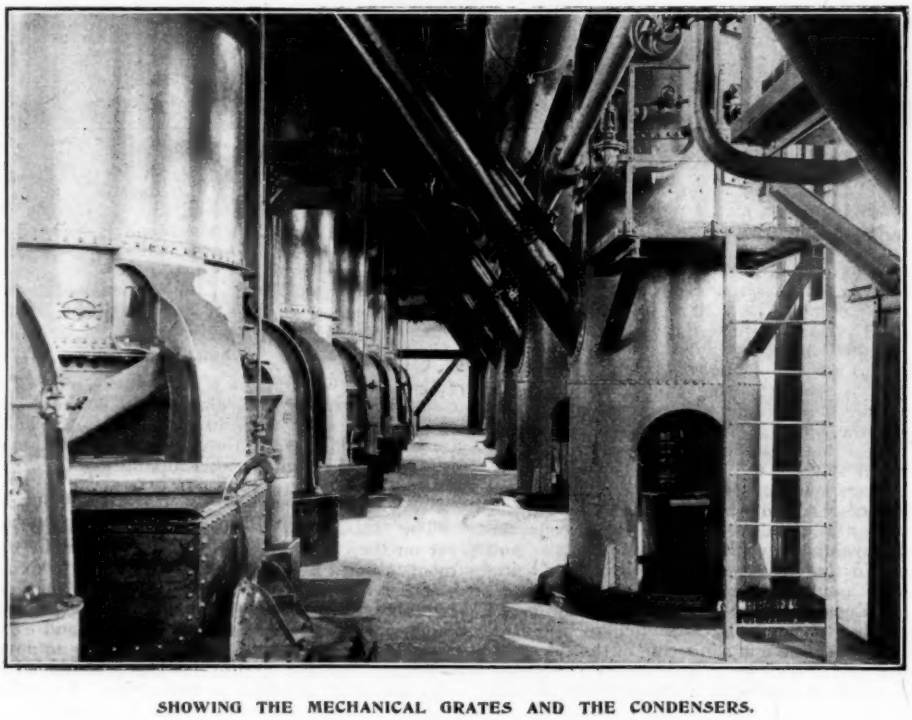
The chamber walls are built of Koppers silica bricks manufactured in Düsseldorf; and the registered expansion since they have been under fire is in the neighbourhood of 1 p.ct.

Traversing of the coke car is effected by an electric loco, which also supplies the compressed air for working the car's discharging doors. Coke quenching is carried out under a water tower which contains a calibrated tank, the contents of which are automatically released by the coke car itself. The water falls on to a spreader carried above the car. Quenching takes 40 seconds and steam clearance 4 minutes; 15 cub.m. of water [3333 gallons] being used per chamber of 8 to 9 tonnes of coke. Any water not vaporized is filtered and pumped back into the tower.

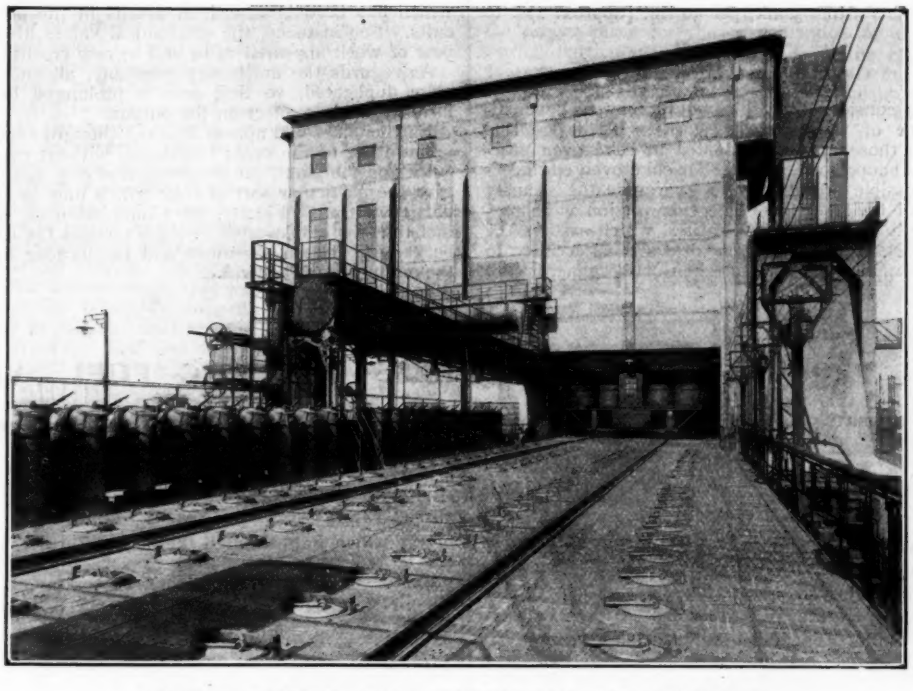
The Guarantee Test.

The installation was ordered in 1925, built in 1926, and put to work in October of that year. A test, for guarantee purposes, was carried out by the Karlsruhe Institute from July 7 to 17, 1927, with the results shown in the table herewith.

Coal throughput, 24 hours	405 tonnes 398 tons
Ash and water content	15·2 p.ct.
Weight of charge	10·53 tonnes 10·36 tons
Gas made from coal as charged	306 cub.m. per tonne 10,980 c.ft. per ton
C.V. of gas, gross at N.T.P.	5285 cals. per cub.m. 594 B.Th.U. per c ft.
"Pure" coke used in producers, p.ct. by weight on coal as charged	9·63
Inerts in gas, p.ct.	7·3



SHOWING THE MECHANICAL GRATES AND THE CONDENSERS.



CHAMBER CHARGING STAGE, SHOWING COAL CAR AND TOWER.

Cost of the Plant.

The total cost of this carbonizing plant was some 2 million marks, roughly divided as to 700,000 mk. for handling and crushing machinery, 1,000,000 mk. for the chamber ovens proper, and 300,000 mk. for the producers. A nearer estimate for the latter would perhaps be 45,000 to 50,000 mk. for each producer together with its share of the structure, coke transporter, washer, blower, and ancillary plant. The cost price of each chamber (out of a minimum of 20) might be put down as 50,000 mk., including its proportion of coal tower, quenching plant, pusher, coke car, and coal car—no duplication being allowed for, nor cost of coke screening. This capital cost thus provides for the carbonization of an average of 15 tonnes (14¾ tons) per day.

Other Details of the Works.

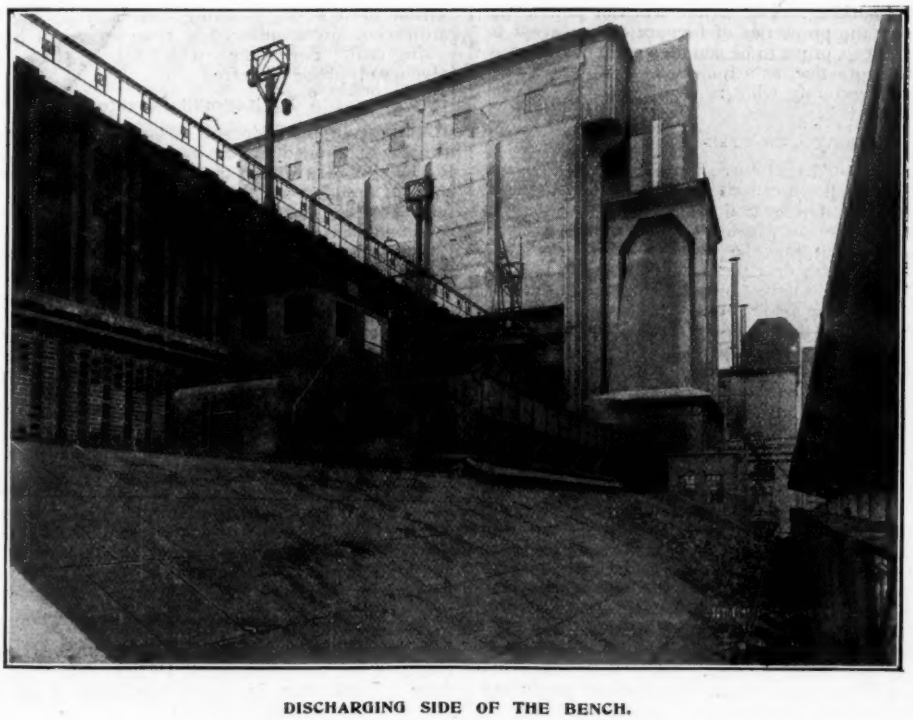
Purification is by oxide of iron, and measurement of the gas is carried out by ordinary station meters and by a rotary meter of 70,000 cub.m. [nearly 2½ million c.ft.] per day capacity. The accuracy of this instrument is within 2 p.ct. between maximum and one-third throughput; and it is only 1 m. in diameter and 1½ m. high.

The storage on the works is something over 5¼ million c.ft., but there is also holder capacity of 350,000 c.ft. on the other bank of the Rhine. Sulphate of ammonia is manufactured by an indirect process; and the plant is only worked intermittently, as its capacity is considerably in excess of requirements.

Selling Prices.

The manufacture and sale of gas in Düsseldorf are in the hands of the Municipality, as are the services of water and electricity; and at the time of the visit the price of gas for domestic use was 18 pf. per cub. m. [approx. 5s. per 1000 c.ft.], and for industrial purposes 7 to 12 pf. [2s. to 4s. per 1000 cft.]. For the industrial scale, the minimum annual consumption must be 1200 cub. m. [42,375 c.ft.]; the rate being graded down thereafter to the 7 pf. figure.

This tariff was fixed when gas coal was costing 19 to 19·5 mk. per tonne, and washed coking smalls 18 to 18·5 mk.; the average calorific value of the mixture being 7200 cal. per kg. [12,950 B.Th.U. per lb.]. The selling price of coke, ac-



DISCHARGING SIDE OF THE BENCH.

cording to grade, is 1·3 to 1·5 mk. per 50 kg. [approx. 26s. to 30s. per ton].

General Impressions.

The Committee consider that this works may well constitute the prototype of the coke-gas works. If the general arrangements are those normally adopted in coke oven practice, then they are bound to recognize that coke oven engineers have taken all possible precautions to guarantee the security and permanence of their service. The Commission were particularly struck with the compound heating, which assures the maintenance of heats even in the event of a serious accident to the producer station. Note was also taken of the general care which has been bestowed on details in the producer gas circuits. For instance, the mechanical valves after more than a year of work appeared to be still in new condition.

As regards the machinery generally, all ancillary apparatus were duplicated, so that even a prolonged breakdown need have no adverse effect on the output.

Further, it would appear that the thought expended upon the preparation of the coals facilitates, without causing any difficulties on the plant, the preparation of coal mixtures which will give the particular sort of coke which may be in demand at a particular time. Finally, the Commission lay stress upon the fact that the employment of silica enables the coking period to be varied between seventeen and twenty-four hours, and thus the output of gas and coke.

THE PRODUCTION OF SMOKELESS DOMESTIC FUEL.—VIII.

By JOHN ROBERTS, D.I.C., M.I.Min.E., F.G.S., Author of "Coal Carbonization: High and Low Temperature."

(*Concluded from p. 311.*)

THE "HOMITE" (ROBERTS) PROCESS.

In previous articles the chief low-temperature processes have been briefly described. It is said that hundreds of other processes, differing chiefly in mechanism, have been proposed, and much capital is being expended in experimental work in various parts of the world. The essential principles involved in most processes, however, are embraced in those that have been described. What interests the gas engineer and the coke oven manager chiefly is how their existing system may be modified to produce the main product sought in low-temperature processes. Yields of 5000 c.ft. of rich gas, or 35,000 c.ft. of low-grade gas, will not appeal to either, except in rare instances, but it is believed that they would seriously consider processes offering yields of 10,000 c.ft. of 500 or 550 B.Th.U. gas.

Hitherto, the gas engineer aimed at the complete extraction of the gas from the coal, and he has even gone further, and gasified part of the fixed carbon by steaming the coke. This practice will continue, but the system should not become universal; the need for smokeless fuel suitable for general use in domestic grates demands that the gas companies should endeavour to manufacture such a fuel. The coke oven manager also expels practically the whole of the volatiles from the coke in his efforts to produce hard metallurgical fuel. In the later stages of his process he often allows the lean gas to go to waste. If it were universally accepted that this system produced the best coke, and that the complete expulsion of the volatiles was essential, it would be risky, if not foolish, to suggest any change. A few years ago, however, authorities on coke manufacture, such as Koppers, Sperr, and Jacobsen, stated that the carbonizing temperature should be from 650° to 800° C., and that furnace coke should give off volatiles freely when heated at about 750° C. In other words, blast-furnace coke should be free burning. The writer will not pursue the matter of prescribing the properties of furnace coke, except to say that if Koppers' views prove to be sound, a great change may be expected in coking practice, as a fuel made at the foregoing temperature range is certainly what is required by the householder.

Requisite Properties of Free-Burning Coke.

It has already been stated that there is no necessity to leave 10 p.ct. of volatile in a coke in order to ensure ease of ignition and good combustibility. On several occasions the writer has insisted on a volatile range of 3 to 8 p.ct., but in the light of recent experience, this can now be reduced to 3 to 5 p.ct. Smokeless fuels containing 3 or 4 p.ct. of volatiles ignite with certainty, and, provided they have the requisite structure, burn quite vigorously in the open grate. Other essential properties of such a fuel are that it should be robust enough to stand handling and transport; its ash content should not exceed 10 p.ct.; its structure should not be too fine-grained, unless very low in ash; and it should not burn too readily, otherwise wasteful consumption results. Some smokeless fuels will burn almost as readily as a lignite briquette, which, once ignited, burns completely, even though surrounded by a thick layer of ash. For example, if a moderate fire is left in the grate on retiring for the night, it will be found that no cinder is left in the morning, the fuel having been burning through during the night, to no useful purpose. The waste resulting from this may be taken as 1 lb. of fuel per fire, or 5 p.ct. Hence, from the point of view of economy, this is not desirable; the fuel should leave cinders, which could be used the following morning when laying the fire.

Not only should the fuel be firm enough to stand handling before being put into the grate, but it should also remain firm during combustion, and stand poking. Some semi-cokes become exceedingly friable after partial combustion, producing breeze which falls through the bars. Further, the fuel should not be bulky; it must not be as dense as a Durham furnace coke, nor need it be as porous as continuous vertical coke. Finally, the moisture content should be low, and in any case should not exceed 5 p.ct.

High-Temperature Free-Burning Coke.

Having prescribed the properties of the fuel, the next question is: Can it be made in gas retorts and in coke ovens? In a paper on this subject published in 1921, the writer stated: "These experiments lead me to predict that semi-coke can and will be produced in bulk by carbonization in coke ovens and in gas-retorts, using standard plant." Thanks to the interest and co-operation of the Woodall-Duckham Companies, that prediction has been fulfilled, as far as gas-works plant is concerned. It will also be fulfilled at an early date in the case of coke ovens.

Before dealing with the results achieved, reference must be made to the underlying principles. In order to produce a fuel having the requisite volatile content, the average carbonizing temperature must be reduced below 900° C. That fact seemed so perfectly obvious that attempts were made on one plant (not at the writer's suggestion) to make the fuel by reducing the flue temperatures. The tests were unsuccessful. Then followed a series of tests using higher temperatures, but speeding up the process by increasing the throughputs, again without success. In order to reduce the carbonizing temperature, while maintaining high flue temperatures, the charge of coal must be prepared in such a way that it facilitates heat penetration to the centre line. This can be accomplished by eliminating the plastic layer. We have already indicated that the two chief methods of attaining this end are preheating and blending. The simpler plan is the latter. The blending ingredients must consist of a strongly-coking coal and an inert fuel such as anthracite, low-volatile slack, coke breeze, or high-volatile non-coking coal. For reasons which follow, the latter class of fuel is generally to be preferred.

Blending Ingredients.

Apart from the proposals made to utilize anthracite duff, as already mentioned in previous articles, it has been shown by R. Ray ("Gas Journal," Carbonization Number, Feb. 14, 1928, p. 133) that small proportions of anthracite can be successfully used as inert in coke ovens, where it is available at a reasonable price, but it will not stand heavy freight charges. Low-volatile Welsh steam slacks can be used in a similar manner, but in both cases low yields of gas are to be expected, while the yield of solid fuel will be proportionately increased. Coke breeze can be utilized as the sole inert, if desirable, but the objection here is the fact that breeze is generally high in ash, and limited in quantity. In fact, breeze need not be produced for disposal at gas-works or coke ovens, as the small quantity made should be utilized in the coking cycle. The use of washed coke breeze would entail drying, or the alternative of heavy moisture charges, so that it need not enter calculations except where it is desired to use up one's own make. A further point to be borne in mind is the fact that breeze would yield no gas, and therefore the make of gas per charge would be reduced. However, as E. V. Evans has pointed out, the gas yield per retort will be slightly increased. The foregoing considerations make it desirable to select high-volatile non-coking coals as the inert medium. Such fuels are available in greater quantities than the others, and they prove eminently serviceable.

Reducing Average Carbonizing Temperature.

It is well known that if an attempt were made to drop a charge from an intermittent vertical retort, or push a charge from a coke oven, in about two-thirds of the normal coking

time, using good coking coals, the middle section would be found to consist of uncarbonized coal, while the "cauliflower" ends would be hard baked. This is due to the slow rate of heat penetration resulting from the development of the plastic layer. To enable discharge to be effected readily, the plastic layer must not be allowed to develop, and carbonization must progress uniformly to the centre, without over-coking the "cauliflower" sides to an excessive degree. In other words, the middle of the charge must be raised to a temperature of about 650° C. in the shortest possible time. This is the object of using the inert non-coking coal, the effect of which is to enable the retort or oven to be discharged while the fuel contains, on an average, about 4 p.ct. of volatile matter, and is equivalent to carbonizing at an average temperature of about 750° C. Without going into minute detail, this was the plan adopted by the Woodall-Duckham Company, through the courtesy of Mr. R. H. Ruthven, in the intermittent vertical chambers at the Ramsgate Gas-Works. The first series of experiments was run in January last; and though the results were very promising, they were not 100 p.ct. successful. The technique has been further developed, and the second series of tests were run in May, with eminently satisfactory results. In these tests all calculations and predictions were fulfilled, with one exception—it was not anticipated that the fuel would possess such excellent combustible properties.

The New "Homite" Fuel.

In these large-scale tests, blends of strongly-coking coal and high-oxygen coal, in varying proportions, were carbonized at high temperature, but for a considerably shorter period than the normal. The charges dropped as readily as fully-carbonized charges; the optimum blends dropping within 5 seconds. It was found that carbonization had sufficiently progressed to cause both halves of the charge to unite in the middle, to a certain extent. The fuel, now known as "Homite," consisted mostly of large "blocky" coke, with "cauliflower" well developed; and the experiments proved that under the right conditions of temperature and blend, 100 p.ct. of the coal carbonized can be converted into marketable domestic fuel, the superior to which has not been made under low-temperature conditions. Photographs of typical pieces of the fuel are reproduced.

There being no satisfactory standard of determining the combustible properties of such a fuel, the simplest plan was to use it in an ordinary grate, which, after all, is the final court of appeal. The first test was made in a very ordinary grate, using the paper and chips that had been laid for a coal fire. The fuel was selected in haphazard fashion and laid indiscriminately on the wood, and the paper was set alight. First evidence of ignition of the coke was observed in 3 minutes. Within 8 minutes ignition appeared certain, and within 15 minutes the fire was nicely aglow. By the end of half-an-hour combustion had spread to the top of the fire, the grate being filled with coke to a depth of 6 or 7 in. After replenishing to make up for the collapse following the burning of the chips, the fire was afterwards fed at intervals of 2 hours, remaining absolutely untouched in the intervals. The fire gave every satisfaction. On a subsequent occasion the temperature was determined by means of a disappearing-filament pyrometer in the same grate, and with the same kind of fuel. The pyrometer recorded a temperature of 1100° C. under normal chimney draught conditions.

"Homite" fuel has since been used in several different types of grates, including the well and semi-well types, and has proved entirely satisfactory. It must be admitted that "Homite" will not ignite as readily as some fuels made at lower temperatures, but it ignites with certainty. Ignition, however, is easily facilitated simply by using the previous day's "Homite" cinders, laying these on the wood, and placing fresh fuel above the cinders.

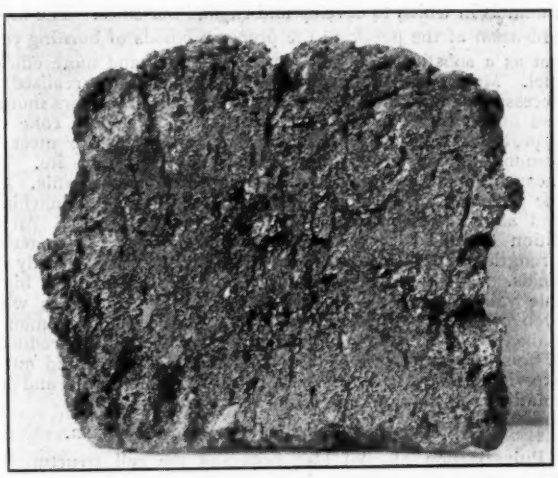
It has generally been found advisable entirely to close the ash dampers below the fire when using this fuel, whereas dry-cooled nut coke in similar grates requires free access of air below the fire. The fuel requires a minimum of attention, but it will stand poking or being turned over with a small shovel in the grate.

How the Gas Industry May Benefit.

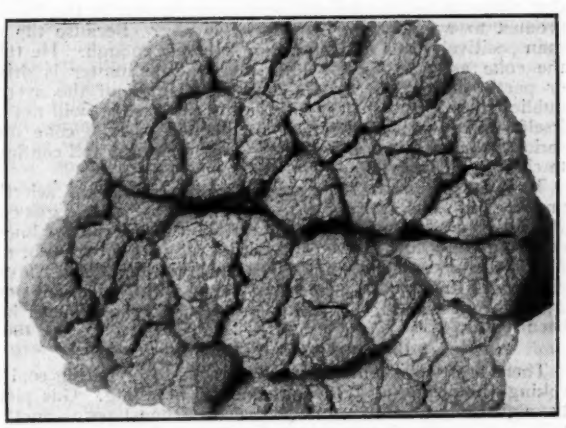
The conclusions to be drawn from these trials are that free-burning smokeless fuel can be produced under high-temperature conditions in intermittent vertical retorts, while obtaining yields of about 10,000 c.ft. of gas and 10 gallons of tar per ton of coal. The fuel possesses the requisite properties of domestic fuel for use in open grates, being readily kindled, having good combustibility, high radiant efficiency, requiring little attention, and being, of course, smokeless.

The Roberts blending process is impracticable in continuous vertical retorts, because static conditions of carbonization are essential when using optimum blends or preheated coals, otherwise a large proportion of fines is produced. A further difficulty in these retorts arises from the necessity of using coal which passes a ½-in. mesh in the blends. On the other hand, the use of intermittent verticals in conjunction with continuous verticals, as in the Dawsholm scheme, will allow of the use of nut sizes in the continuous retorts, and the smaller sizes for the manufacture of domestic fuel in the intermittents.

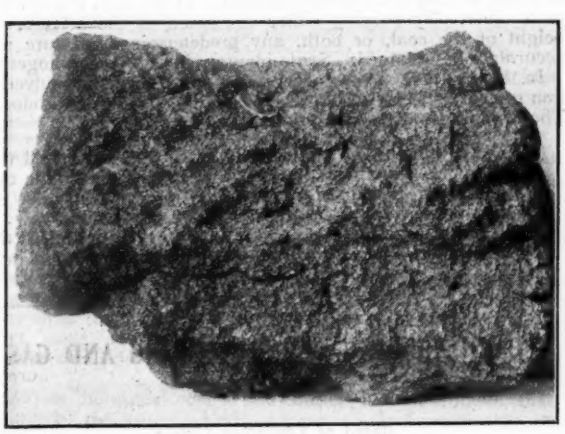
It is becoming increasingly realized in the gas industry that the proper place for the carbonization of coal is at the gas-works, particularly in towns outside the coalfields. The advantages at hand are the outlet for gas and the coke-selling organizations already in existence. The object of this article is to help them to realize that it is within their power to manufacture a much more suitable domestic fuel than is now being made—a fuel which has long been promised by low-temperature enthusiasts.



"Homite," showing texture.



"Homite," showing "Cauliflower" structure.



"Homite." Rough granular fracture.

In the coalfields, provided suitable modern narrow coke ovens are available, a similar type of fuel will also be manufactured in the near future, on a scale which will bring appreciably nearer the day when the burning of raw coal in domestic grates will cease.

I wish to thank the Woodall-Duckham Companies and Mr. Ruthven for permission to make reference to their work.

COKE—THE DOMESTIC FUEL.

By JOHN T. BYRNES, Sales Manager to the Hamilton By-Product Coke Ovens, Ltd.

[From a Paper before the Canadian Gas Association.]

We producers of coke, who know that properly prepared coke is better and worth more than anthracite, have two channels in which to develop and expand our sales. The first is education of the public to the proper methods of burning coke, not as a substitute for coal, but as a better and more efficient fuel. Most coke producing gas companies have realized the necessity of this, and have made in the past few years more or less headway. The second channel is to produce a coke that approaches anthracite in its burning properties, to meet the demand of those who are accustomed to anthracite. This means the mixing of two coals—high and low volatile. Can the gas man afford to do this—instal the necessary machinery and accept lower yields of gas, tar, and ammonia? An addition of 10 to 15 p.ct. of low-volatile coal will materially strengthen the coke produced without affecting greatly the yields. This coke produced will eventually command a higher sale value. Proof of this is shown in the territories where oven coke and retort coke compete. While the oven man installed his coal mixing machinery primarily for the production of foundry and furnace grades of coke, he has found out by experience that it pays him to mix the high-volatile and low-volatile coals for making domestic coke.

THE ATTITUDE OF THE GAS MANUFACTURER.

Pulverization of coal also improves the cell structure and hardness of the coke produced. Apart from the cost of installation, pulverization of coal is not expensive. In fact, if the average gas plant had this equipment, and paid as little attention to the manufacture and preparation of coke as it does to-day, there would not be sufficient improvement in the finished product to warrant the investment. Why? Because the gas man positively does not take coke seriously enough. He takes the coke as what is left after the volatile matter is driven or partly driven off (this is also the opinion of the average public citizen), and then wonders why the product will not sell itself. Whether the gas man is inclined to take coke more seriously or not, he will have to as the price of gas oil continues to climb.

Too much cannot be said of the importance of selecting proper coal. The average gas man will choose a good gas coal. Perfectly correct, but at the same time select a coal of known coking quality, low in ash, and with a high fusion-point of ash. Many customers condemn coke as a domestic fuel because it clinkers in the furnace, whereas if a coal with fusion-point over 2500° had been used, their complaint would probably never have been heard.

PREPARING COAL FOR COKING.

There are two commonly used methods of preparing coal for coking—namely: (*a*) Crushing, and (*b*) breaking. Gas plants throughout the country use a crusher of one type or another, while practically all coke oven plants use a breaker.

The advantages of mixing coals to improve the coke have already been discussed. The present method of accomplishing accurate mixing is by means of belts. These belts run towards each other. By varying either the speed of the belts or the height of the coal, or both, any predetermined mixture may accurately be obtained. Some plants mix three coals together.

In the first part of the paper, it was mentioned that pulverization of coal helped to improve the quality of the coke produced. The advantages of pulverization are as follows:

(*a*) The ash in the form of slate is, of course, pulverized with the coal. As the pulverized coal carbonizes in the oven or retort, the coking takes place more uniformly, and produces stronger and more regular cell walls.

(*b*) When a large piece of coke is examined, it is noticed that at almost each cross-fracture a small piece of slate is located. This fracture is caused by the difference in the coefficient of expansion between the coke and the slate. Pulverization of the coal decreases the tendency of the coke to cross-fracture on quenching. In other words, pulverized ash distributed through the coal strengthens the resulting coke and produces a larger coke.

(*c*) When two or more coals are mixed, the pulverizer obviously acts as a thorough mixer, and thus helps to produce a coke of more uniform structure.

(*d*) From a domestic consumer's point of view, pulverization of coal is desirable. He obtains no unburned carbon under his furnace or range grate, and has, therefore, no cinders to pick over. Many of our customers have felt that this was an important feature of our product.

The proper and accurate control of heating the carbonizing chamber has an important influence on the character of the coke made. Over-coking produces a smaller, harder, brittle coke, while under-coking produces blocky, tough, but soft coke having black ends and a bad appearance.

The speed at which the coal is carbonized also plays a part in the characteristics of the coke produced. Fast carbonization makes a smaller and weaker coke having larger cells than coke produced under slow carbonization.

PREPARATION OF COKE FOR THE MARKET.

The preparation of the coke is another item of importance requiring the closest attention to the details of quenching, conveying, crushing, and screening. Each plays its part. Considerable progress has been made in recent years in the screening of coke. The old-type rotary and bar screens have been discarded, and the most efficient practice at present is small disc grizzlies for egg cokes, or larger, and shakers, vibrating or hummer screens, for the smaller sizes.

Coke should be loaded so as to provide a minimum drop into cars. Unless the handling equipment is especially designed to load cars, there is a fairly big drop in most cases, which obviously will cause considerable breakage. In cases where domestic coke is loaded into cars from storage bins, re-screening is advisable. Cars should be inspected for cleanness before loading, and all foreign material removed. Presence of foreign material in the car will cause ill-feeling on the part of the consumer. Foreign material in the bottom of cars becomes thoroughly mixed with the coke on unloading, for most cars are unloaded from the bottom.

A manufacturing plant producing coke must almost without exception store coke during the summer months. Needless to state, the successful storage of coke presents its difficulties, increases the cost of the product, and detracts from its appearance. Despite these drawbacks, I feel that coke should be stored, whether profitably or not (in most cases it is profitable), rather than sold during the periods of slack demand by material price cutting. True, some advantage is obtained in price cutting by increasing the field of the market, but, on the whole, the psychological effect on the domestic trade (until the domestic field is more thoroughly developed) is to cheapen the value of this article in the mind of the domestic buyer.

Coke stored in the summer will in the winter pick up moisture, and freeze. Whether it freezes or not, it is difficult thoroughly to screen wet coke and free it from breeze. It is therefore better to store sized coke than it is to store run-of-oven coke or mixture of sizes. True, this costs more, as the bulk of it should be re-screened before it is ready for sale. The coke producer must always bear in mind, when considering and discussing these points which increase the handling cost of coke, that coke is worth more than it sells for to-day, and will eventually command a higher price if it is always sold everywhere as the best finished material that the gas man can produce.

TEACHING OF GAS ENGINEERING AND GAS SUPPLY.

Board of Education Course.

For the second year in succession the Board of Education have provided a Course for teachers of Gas Engineering, Gas Supply, and ancillary subjects. Both courses have been held at the Westminster Training College and the Westminster Technical Institute, and have occupied five full days. The Course for the current year, which closed on July 27, was attended by teachers from the London Area, Eastbourne, Reading, Treforest, Newport, Weston-super-Mare, Gloucester, Coventry, Birmingham, Huddersfield, and Liverpool. About half the time was devoted to methods of teaching and blackboard drawing or gas supply laboratory practice. The last-named subject included a late evening demonstration of outdoor photometry. Visits were paid to the Home Office Industrial Museum, and to the Laboratories of Radiation Ltd.

Four special lectures were given. One was by Dr. Margaret Fishenden, on "The Thermal Efficiency of Heating Appliances;" a second by Dr. Alex Scott, on "Refractories Employed in Gas Manufacture;" a third by Dr. A. Parker, on "Waste-Heat Boilers;" and a fourth by Mr. H. J. Hodsman, M.Sc., on "Pyrometers."

Nearly all the teachers lived in the Westminster Training College, and together with organizers and instructors formed part of a group of nearly 150 men engaged in different branches of technical education throughout the country. The utmost keenness and enthusiasm prevailed, and everyone will retain pleasant memories of the work he did and the comradeship he enjoyed.

VALUATION AND TAXATION OF GAS UNDERTAKINGS.

By R. M. SIMPSON, of Denny.

[Before the North British Association of Gas Managers, April 13, 1928.]

It occurred to me that the subject of my paper would be suitable in view of the present endeavour to have the basis of taxation under the Lands Valuation Act made more equitable and simple. I have recently been engaged in several appeals against impositions upon the undertaking under my charge both for local and for Imperial taxes, as a result of which considerable modifications were secured; and I think an account of the negotiations and arguments with our Assessor and Inspector of Taxes may prove of interest, and perhaps of service, to some of our members.

LANDS VALUATION ASSESSMENT.

The statutory direction under which gas-works are valued is contained in the Valuation Act, 1854, section 6, and is to the effect that the valuation of an undertaking should be the rent at which, one year with another, it might reasonably be expected to let.

The interpretation of this direction is known as the "Revenue Basis," and derives its authority from a series of decisions of the Lands Valuation Appeal Court. Gas undertakings are seldom, if ever, actually let, and the idea underlying the revenue method is to ascertain what rent a hypothetical tenant could afford to pay. This is determined on the basis that he would be willing to pay the whole revenue under deduction of the cost of running the concern, including working and administrative charges, occupier's rates, a reasonable return on the capital he would require to provide, and, if the undertaking is one on which the owners are allowed to make a profit, a reasonable percentage for tenant's profits.

As a municipal authority is not permitted to earn profits, no allowance is made in their case for tenant's profits. No deduction is allowed for owner's rates or capital depreciation; these being considered to be landlord's charges, which are payable out of the hypothetical rent.

FORMULA FOR REVENUE BASIS.

The formula for arriving at a valuation on the basis of revenue, in the case of a Corporation, is shown in Appendix II., which is the latest computation applicable to the Denny and Dunipace gas undertaking.

TENANT'S CAPITAL.

The amount to be allowed for tenant's capital or, as it is sometimes called, "floating capital," is the chief bone of contention between the assessor and assessed, when dealing with the valuation of gas undertakings; and the application of this part of the "Revenue Basis" varies greatly with assessors.

The items which are now generally conceded, are set forth in Appendix II.; and I shall now deal with these *seriatim*.

(1) *Stocks.*—Of the stocks which a tenant would have to provide in carrying on the business, coal is the most important. The amounts allowed by different assessors vary widely. Some assessors allow six weeks' maximum requirements; others one-sixth or one-eighth of the year's supply. In some cases actual stocks on hand at the end of the year are allowed; while in other instances, including the undertakings valued by the Assessor of Railways and Canals, no allowance is given.

It is the practice of some assessors to confuse the issue by referring to the allowance which is given for working expenses, and implying that this allowance is sufficient to provide for the stock of coal necessary to carry on; but these allowances are distinct.

The hypothetical tenant must have in the business sufficient capital to provide coal to tide him over such length of time as may be occasioned by any unforeseen cause; the chief contingency being a coal strike.

The tenant cannot invest the capital temporarily and withdraw it when he deems it advisable to lay in a stock of coal. He must keep it floating in his business, and it ought to be allowed without question. It is therefore difficult to understand why the Assessor for Railways and Canals, who is responsible for assessing many important undertakings, does not allow it.

From recent experience, it is evident that even the above-mentioned allowances are inadequate to meet present conditions, bearing in mind that the last coal strike endured for 29 weeks, covering part of the period of maximum demand.

It will be interesting to learn, in the course of discussion, how many have approached their assessors with a view to a larger allowance for stock of coal, and with what results.

(2) *Tenant's Fixtures and Movable Plant.*—This item is readily allowed; the greatest difficulty being as to what is heritable and what is not. In 1920 the National Gas Council District Executive Board for Scotland submitted to the Association of Local Lands Valuation Assessors of Scotland a list of plant and fittings which they claimed as movable; and Appendix No. IV. shows the items agreed to by the assessors. The merit attached to this list is that assessors readily allow it; but this does not mean that it comprehends all it should. It is not accepted by gas authorities as a complete list.

Probably there are members who are getting allowances for chattels over and above those enumerated in this list. If so, I hope they will state them for the general benefit.

(3-5) *Meters, Cookers, and Fittings.*—These are now generally conceded as being tenant's chattels; and in view of recent favourable decisions in the cases of Ipswich, Cowdenbeath, and Stranraer, those undertakings who are not granted an allowance for these need have little fear of an adverse decision in the event of an appeal.

The question may arise, in arriving at the amount which the tenant is to be allowed for these items, whether present-day costs or prime costs should be taken. Bearing in mind that the object of this allowance is suitably to recompense the tenant for the capital which he has invested in the business, probably prime costs should be taken. It is difficult, however, in the case of many undertakings to ascertain the actual sums spent on the various items. To take the book value, as is done by many assessors, is obviously unfair to the tenant, because, in the first place, the original purchase price of the undertaking includes the cost of meters, and, if any, stoves and fittings; and these items are seldom detailed separately. Moreover, it is the practice of many undertakings to provide part of these chattels out of revenue; and consequently the amount so provided is not shown in the capital account, though, in arriving at the valuation, such expenditure may have been disallowed. It is therefore a common practice to have the meters, stoves, &c., valued at the costs prevailing when the valuation is being prepared, subject to a deduction in respect of depreciation. If the hypothetical tenant is regarded as changing from year to year, this method is probably sound, on the principle that the new tenant would take over the plant at its present value.

The valuation for the Denny undertaking was adjusted in 1924, and the figures arrived at as representing prime costs were a compromise between the prices ruling at that date and pre-war values. All the meters were taken at an average value of £2 9s. 6d. each, which included cost of fixing; and from this sum a deduction of 15 p.ct. was made for depreciation. The cooking appliances were dealt with at the following average rates: Cookers, £4 11s. 6d.; cost of fixing, £1 5s. Hotplates, 21s.; fixing, 15s. Grillers, 8s. 3d.; fixing, 15s. Gas rings, 2s. 6d.; fixing, 13s. From the sum brought out at these rates, 25 p.ct. was deducted for depreciation. Fitted houses were valued at £5 per house, from which a depreciation rate of 10 p.ct. was deducted.

I have quoted the above figures in detail, as they may prove of interest for the purpose of comparison.

If the assessor had taken the actual book value, even without any depreciation, then the terms we should have received would have been very much less favourable, as is shown by the following statement:

—	Terms Agreed.	Book Value.
	£	£
Meters	4500	3336
Stoves	4691	2301
Fittings	3622	Not shown

It was further arranged that, for a period of five years, additions at actual cost would be made from year to year under deduction of the above-mentioned rates for depreciation. On the expiry of the period of five years, we shall probably re-open the question with a view to securing a revaluation at present-day costs (instead of the artificial basis of present-day and pre-war costs above-mentioned)—subject to fair allowances as representing depreciation—to bring out the present value of the plant.

When the actual cost of the chattels is ascertainable, that is, I think, the correct basis, because it represents the actual amount invested in the business. As the hypothetical tenant is only allowed 5 p.ct.—that is, the rate of interest he might obtain in a gilt-edged security—there is no margin for depreciation. In my own case, present-day cost is adopted as the basis simply because actual costs are not available.

Many assessors decline to allow the cost of renewals of tenant's chattels to rank as ordinary expenditure; but this is clearly a legitimate item, seeing that the rate of 5 p.ct. allowed is intended only to cover interest, and not maintenance. Since 1924 we have been allowed renewals.

(6) *Floating Capital.*—This is the sum required by the tenant to finance the business; and the sum that should be allowed depends on the longest period that credit is given. Some

assessors allow one-half, others five-twelfths, and many only one-third of the working costs for the year.

The judgment given in the Cowdenbeath case fixed the proportion as one-third. In this case stress was laid on the increased use of prepayment meters; but to my mind this has no direct bearing on the question, as it depends entirely on the duration of the period between slot meter collections. For example, take the case of the Denny undertaking. Our prepayment meters are emptied three times a year, but, though cash is collected from day to day, it does not alter the fact that four months' gas is supplied before payment is received for it. In the case of the ordinary meters, it is practically six months before payment is received, as it is a month after the survey is taken before the accounts are rendered and payment commences. Our meters are approximately in the proportion of half prepayment and half ordinary. Five-twelfths would be a reasonable proportion to allow. We received that allowance and pressed for its continuance, but it was reduced to one-third owing to the decision in the Cowdenbeath case, and nothing short of an appeal would have moved our Assessor. We were not prepared to appeal, as that was the only matter on which we were at variance.

The Cowdenbeath undertaking is now valued by the Assessor of Railways, who, as before mentioned, allows one-half in the general case; and the decision has resulted in the anomaly of the Railway Assessor allowing one-half to all undertakings he values with the exception of this one, which is allowed only one-third.

It would be interesting to learn if there are any undertakings who have since come under the Assessor for Railways and Canals, and, if so, what allowance they receive.

The theory of the hypothetical tenant involves the payment of a hypothetical rent which the landlord would require to receive at the usual terms to enable him to pay interest, sinking fund, owner's rates, and taxes. I have never heard of this being claimed, but it seems sound that it should be taken into account in fixing the sum to be allowed as tenant's capital.

On whatever sum is adjusted as representing capital invested by the tenant, a rate of interest, usually 5 p.ct., is allowed, as a deduction in arriving at the valuation under the formula above mentioned.

In the event of an undertaking being in the areas of more than one rating authority, the *cumulo* valuation so arrived at is allocated on the basis of the capital heritable value of the undertaking in the various areas concerned. Appendix III. shows how this applies to the Denny undertaking.

Under the first Schedule of the Rating (Scotland) Act, 1926, a deduction of 20 p.ct. is allowed from the gross annual value brought out as above. Showrooms and dwelling houses are not subject to this deduction.

Where an undertaking is in more than one parish, gas authorities have the option of applying to the Railway Assessor to have their undertakings valued by him in place of by the assessors for the districts in which the works are situated.

Dissatisfaction with the Revenue Basis of Valuation.

The valuation brought out on this basis is open to many objections, the chief of which are that it is not uniformly applied to all undertakings by different assessors, and that it results in municipal concerns being valued at high amounts as compared with trading concerns of similar capital value producing similar revenue. Attempts have been made from time to time to have the basis altered, but without success. At the present time it is under review by the powers that be.

It has been said, however, that the hypothetical tenant is not altogether a bad sort of fellow if properly used; and with this I am in agreement. A hypothetical tenant implies a hypothetical landlord; and a comparison between a return which he would expect upon the gross capital he has invested and the amount the tenant actually pays in rent, when individually applied, is interesting. Our capital account shows a total capital expenditure of £57,505, and the hypothetical rent is £2214. Even taking into account that a large proportion of the capital expenditure represents plant which has been superseded, and is no longer effective, the hypothetical rent is probably not excessive, as capital expenditure during the past few years has been abnormal, and the valuation will proportionately decrease as this is repaid.

One point which creates a sense of injustice more than any other is the adding back of the owner's rates and feu-duties. That is done on the principle that these are a charge on the landlord and not on the hypothetical tenant; but it seems unjust that revenue raised to pay these burdens should be added back to increase the rent.

Another matter which gives municipal undertakings a sense of not being dealt with fairly is that, in arriving at the valuation, no allowance is made in their case for tenant's profits. The statutory direction cites a hypothetical tenant; and such a tenant would expect a reasonable profit.

Income-Tax.

Gas undertakings were formerly assessed for income-tax purposes under Schedule A, Rule No. 111 (3) of the Income-Tax Act, 1918, which states that the annual value shall be understood to be the profits of the preceding year; but this was amended by section 28 of the Finance Act, 1926, which provides that gas undertakings shall be assessed under Case 1 of Schedule D of the 1918 Act.

No. 6 of the rules applicable to Cases 1 and 2 of Schedule D directs that, "in charging the profits or gains of a trade under this Schedule, such deduction may be allowed as the commissioners having jurisdiction in the matter may consider just and reasonable, as representing the diminished value by reason of wear and tear during the year of any machinery or plant used for the purposes of the trade and belonging to the person by whom it is carried on."

The allowances provided by this rule, as regards both the nature of the plant and the rates of depreciation, are the cause of most cases of appeal. It is surprising that even now no uniform classification of plant or rates of depreciation is in vogue. Recently a number of you were good enough to supply me with the rates of depreciation you were allowed; and the variation in the rates given was remarkable.

Prior to 1902, the Denny undertaking received no depreciation. On appealing, an over-all rate of 2 p.ct. was granted. In 1914, again after an appeal, the rate was increased to 3½ p.ct. Last year our Inspector of Taxes refused to allow the rails, chairs, sleepers, &c., of a railway siding as plant, basing his refusal on the fact that Railway Companies are not allowed depreciation on railway sidings. As we were dissatisfied with the flat rate of 3½ p.ct. in any case, it was decided to appeal again on the grounds (1) that railway siding was plant used for the purposes of the trade; and (2) that the flat rate of 3½ p.ct. per annum on the written-down value of all plant was insufficient, especially in view of the greatly increased proportion of capital expenditure, since that rate was granted, on meters and cookers, which deteriorate rapidly as compared with the remainder of the plant, and that separate allowances should be given on the various kinds of plant, which is the common practice. The appeal was upheld, the Commissioners allowing the railway siding as plant, and granting allowances on other plant in accordance with a scale based on the estimated life of the various items.

The allowances granted are detailed in Appendix V. The average now works out at 5·84 p.ct. as compared with 3½ p.ct. formerly, or an increased allowance of 67 p.ct.

Proceeding with an Appeal.

It may be of interest to state briefly what I consider the best manner in which to proceed with an appeal. Intimation of an appeal against his decision is given to the Inspector of Taxes, who in turn notifies the appellant when his case will be heard.

In the meantime, agreement should, as far as possible, be reached with the Inspector of Taxes regarding allocation of the written-down capital among the various classes of plant. The figures submitted in the case of Denny—and which, after being thoroughly examined and discussed with the inspector, were not resisted by him at the appeal—are given in Appendix V.

The next point is to endeavour to agree with the inspector as to the rates of depreciation subject to the approval of the Commissioners, leaving only those upon which agreement cannot be reached to be argued at the Appeal Court. The Inspector of Taxes cannot commit himself definitely to any rate, but, on the other hand, he can offer no resistance to rates which have been discussed and provisionally agreed to. I found that evidence of what was allowed in other places carried considerable weight with both the Inspector of Taxes and the Commissioners.

Renewals or Depreciation.

In place of an allowance for wear and tear during the year, renewals as and when they occur may be accepted. The Inspector of Taxes at the outset proposed that arrangement in our case, but we declined, as it did not appear to be to our advantage; and we submitted that this arrangement was not the "Law of the Land," but an alternative which emanated from Somerset House some years ago, and which we were not bound to accept.

One of our objections is that the arrangement upsets the financing of an undertaking. In the case of an extensive renewal or replacement of plant, the allowance may be so large that no income-tax is payable for a few years; and this may entail a reduction in the charge for gas which will have to be reimposed when the allowance ceases.

My Town Council have always held that the most advantageous method was to take the annual wear and tear allowance; and after fully going into the matter I am in agreement. The following figures will illustrate this contention.

The capital valuation of the Denny undertaking is £42,772, and the rates of depreciation allowed are given in Appendix V. Let us assume that the average life of the undertaking is twenty years, and the rate of income-tax 4s. per £1, and that 5 p.ct. is a reasonable rate of interest on money during the period. The depreciation for the first year amounts to £2499, the income-tax on which is £499 16s. These sums will gradually diminish until in the twentieth year the depreciation would be £705 and the income-tax £141. The income-tax on all the annual allowances between one and twenty years, if compounded with interest at 5 p.ct. per annum, would amount to £10,698. There would also be a balance of £14,942 of unexhausted depreciation at the end of the twenty years, the tax

on which, at 4s. per £1, would amount to £2988, or in all £13,686, which is the monetary value of the income-tax on all the sums which would be allowed as depreciation.

If renewals were taken instead of depreciation, the comparative amount of income-tax on the cost of renewal at the end of twenty years would, if the plant could be replaced at its original cost, be £42,772 at 4s. per £1, or £8554. It is therefore clearly in our interest from that point of view alone to take an annual allowance, but there is another inducement when the effect on the valuation for local assessments is considered.

Undertakings which accept renewals as and when they occur have to raise additional revenue from year to year during the life of the plant, as compared with undertakings which receive annual depreciation, to the extent of the income-tax charges on the yearly depreciation allowances of the latter undertakings; and the sum so raised is treated as profit for valuation purposes, and is liable to owner's and occupier's local assessment rates.

The incidence of this may be shown by again taking the figures applicable to the Denny undertaking, and assuming that the average life of the plant is twenty years, that the owner's and occupier's rates remain stationary at 12s. 4d. per £1, and that a reasonable rate of interest is 5 p.ct. Calculating in the same manner as shown in comparing the income-tax charges, the comparative figures work out at £8440 in the case of "depreciation" against £5275 for "renewals."

COMPOSITE METHOD.

Depreciation and renewals may be taken concurrently—that is to say, while renewals of one or more classifications are allowed, wear and tear allowance can be taken on the remainder. During the recent alterations to the plant at Denny, I did not find it in any case financially advantageous to adopt this method. As an instance, take the replacing of our horizontal settings by vertical retorts. The following are the particulars. The cost of replacing the old horizontal settings, including mountings, with new plant of the same type was estimated at £3500. The sum already allowed on the old plant for depreciation was £285, which, deducted from £3500, leaves £3215 as the sum which would have been allowed as a renewal. On the other hand, the vertical plant is valued at £11,478, which is depreciated at the rate of 5 p.ct., or £574 per annum. As the original cost of the horizontal settings was £950, and this had only been depreciated to the extent of £285, we were entitled to an immediate allowance of the difference of £665 for unexhausted depreciation.

OTHER DEDUCTIONS.

Section 18 of the Finance Act, 1919, provides an allowance of one-sixth of the annual value of premises containing moving machinery. It is usual to include as such any buildings which are attached to, or under the same roof as, the building containing the machinery. The practice is to value the buildings. Five p.ct. of that value is taken as the annual value, and one-sixth of the latter is allowed.

Rented property is allowed, as it is taxed separately; and the profit on sale of gas for public lighting is also allowed on the ground that it is equivalent to charging oneself with a profit.

The above are the main deductions which are made from the profits of the preceding year, and the balance is the amount on which income-tax is levied. Appendix VI. shows the computation applicable to the Denny and Dunipace undertaking for the year 1927-28.

In conclusion, I trust that the result of my effort may be that fresh interest will be taken by many of us in this part of gas-works administration, that it will not be treated as being of mere academic interest, best left to town clerks and treasurers to be adjusted. The gas manager has the greater interest, for if all the legitimate concessions are not obtained, it adversely affects the department under his charge. It should be his endeavour to bring about these concessions. Persistent effort during the past few years at Denny has resulted in securing adjustments which have reduced the burden of rates and taxes to the extent of approximately £600 per annum. This makes it clear that these matters are well worthy of full consideration.

APPENDIX I.—*Denny and Dunipace Town Council.*

REVENUE ACCOUNT.

Year Ended May 15, 1926.

Expenditure.

	£ s. d.	£ s. d.	£ s. d.
1. Manufacture of Gas—			
Coal		3800 18 8	
,, boiler fuel		102 10 1	
Purifying material		,,	
Salary of Gas Manager		332 4 11	
Wages of stokers, &c.		2029 17 0	
Maintenance of works		774 11 0	
Depreciation and renewal		860 18 8	
			7,901 0 4
2. Distribution of gas—			
Meters—Repairs	133 12 11		
Renewals	209 17 4		
		343 10 3	
Stoves—Repairs	194 0 3		
Renewals	130 14 2		
		324 14 5	
Wages		120 8 7	
Discount to consumers		16 0 6	
Written off (bad debts)		65 1 1	
Repairs and maintenance		796 17 10	
			1,666 12 8
3. Rents, Taxes, Rates, and Insurance—			
Rents		3 5 6	
Feu-duty		13 3 5	
Owner's rates		475 2 11½	
Occupier's rates		516 3 11½	
Insurance		42 14 0	
			1,050 9 10
4. Special Lighting—			
Gas account		46 19 2	
Wages		37 9 4	
Mantles, repairs, &c.		2 5 4	
Capital account written off		31 9 2	
Carting		2 18 0	
			121 1 0
5. Other Expenditure—			
Miscellaneous charges		381 0 5	
General administration charges		315 5 10	
			696 6 3
Total expenditure			£11,435 10 1
Balance carried to net revenue account			2,032 0 7
			£13,467 10 8

Revenue.

	£ s. d.
1. Sale of gas, including £111 11s. 7d. received from Burgh General Assessment for gas supplied for public lighting (486,900 c.ft.)	10,573 0 0
2. Residual products	1,997 19 5
3. Rents from property	102 6 0
4. Special lighting district	121 1 0
5. Electricity Department for meter survey	20 0 0
6. Hire of stoves, meters, and fittings	653 4 3
	£13,467 10 8

APPENDIX II.—*Denny and Dunipace Gas Undertaking.*

COMPUTATION BY LANDS VALUATION ASSESSOR, 1927-28.

Year to May 15, 1926.

	£ s. d.	£ s. d.
Profits		2,032 0 0
Add disallowed expenses—		
Rent	3 0 0	
Feu-duty	13 0 0	
Owners' rates	475 0 0	
Depreciation and renewal	892 0 0	
		1,383 0 0
		3,415 0 0
Deduct—		
Property rents	102 0 0	
Tenant's capital	1,002 0 0	
		1,104 0 0
		£2,311 0 0

Average.

	£ s. d.
Year to May 15, 1924	2,467 0 0
,, ,, 1925	1,865 0 0
,, ,, 1926	2,311 0 0
	3)6,643 0 0
	£2,214 0 0

Tenant's Capital.

	£ s. d.	£ s. d.
(1) Stock—		
Coal one-eighth purchases	488 0 0	
Oxide	100 0 0	
		588 0 0
(2) Tenant's fixtures and movable plant—		
Movable plant		100 0 0
(3) Cookers—		
Last year's figure	5,319 0 0	
75 p.ct. of additions	482 0 0	
		5,801 0 0
(4) Fittings—		
Last year's figure		3,622 0 0
(5) Meters—		
Last year's figure	6,154 0 0	
85 p.ct. of additions	417 0 0	
		6,571 0 0
(6) Floating capital—		
Total expenses	11,436 0 0	
Less disallowed	1,383 0 0	
	£10,053 0 0	
One third thereof		3,351 0 0
		£20,033 0 0
5 p.ct. thereon		£1,002 0 0

APPENDIX III.—ALLOCATION OF CAPITAL VALUE OF WORKS FOR THE PURPOSE OF APPORTIONING GROSS ANNUAL VALUE AMONG VARIOUS RATING AREAS.

	£	£
Total capital expenditure (per capital account) at May 15, 1926		57,505
Deduct the following items (not heritable):		
Expenses	248	
Stoves	3781	
Meters	4006	
Special lighting district lamps	195	
House property (separately assessed)	1500	
		9,730
		£47,775

		£	£
1.	Pipes in Burgh—		
	One-third of original purchase price of undertaking	1915	
	Expenditure since on mains and services	1042	
	Proportion of Banknock extension	500	
			3,457
	Apportionment.		
	Denny Burgh	£2457	
	Dunipace Burgh	1000	
2.	Banknock extension—	£3457	
	Cost of mains and services	3882	
	Deduct proportion thereof in Denny Burgh	500	
			3,382
3.	Bonnybridge extension—		
	Purchase price of undertaking	£4950	
	Main and service pipe extensions, 1924-25	983	
		5933	
	Deduct cost of meters	1800	
			4,133
	Apportionment.		
	Falkirk Parish	£2150	
	Denny Parish	1983	
		£4133	
4.	Works, Denny Burgh		36,803
	Total value as above		£47,775

Basis of Allocation among Rating Areas.

Valuation Roll. Section.	Special Districts.	Subjects.	Round Figure Allocation.	Ninety-Sixths.
Denny B.	..	Works	37,000	74
,,	..	Pipes	2,500	5
Dunipace B.	..	,,	1,000	2
Denny L.	Dennyloanhead-Banknock	,,	3,000	6
,,	Bonnybridge	,,	1,500	3
,,	Haircraigs	,,	500	1
,,	Stoneywood	,,	500	1
Falkirk L.	Bonnybridge	,,	2,000	4
			48,000	96

The above allocation was accepted by the Lands Valuation Assessor in August, 1927.

APPENDIX IV.—STATEMENT OF TENANT'S CHATTELS AGREED TO AS MOVABLE BY THE ASSOCIATION OF LOCAL LANDS VALUATION ASSESSORS OF SCOTLAND.

Retort House	All charging machines, drawing machines.
Elevating Plant	Small locomotives, coke bogies, tools in retort house, gauges, registers, &c.
Vertical Retorts	Coke bogies.
Exhauster House	Tools, pressure gauges, fittings, &c.
Purifier House	Oxide of iron in use, oxide (new) in stock, bogies, barrows, and tools.
Station Meter House	Pressure gauges, calorific instruments, desk furniture, &c.
Laboratory	Coal testing apparatus, chemicals and chemical apparatus, photometer, calorific instruments, presses, benches, fittings, desks, &c.
Coke	Coke cranes and grabs, tools, riddles, &c.
Tar	Stocks of barrels, tools, &c.
Sulphate of Ammonia Plant	Storage boilers, acid tanks, barrows, bogies, and bags in stock.

WORKSHOPS.

Engineers	Turning lathes, shafting, boring, all loose tools, slotting and planing machines.
Blacksmiths	Fires, bellows, fans, anvil, vices, loose tools, &c.
Joiners	Benches, circular saws, shafting, belting, &c., stock of wood, &c.
Plumbers and Gasfitters	Machines, tools, shafting, &c., stock of lead piping, brass, lead and tin sheets, machines.
Meter Shop and Fire Appliances	Sand blast apparatus, tools, test holder, stock of lead and composition piping, brass, tin, &c.
Painters	Brushes, paints, pots, and fittings.
Lodge and Store	Oil tanks, weighing apparatus, fittings, desk, &c.
Office	Furniture, bookcases, safes, &c.

MISCELLANEOUS.

Locomotive (large) engines.
Railway wagons.
General tools and implements, barrow, &c., in daily use.
Lifting chain blocks, ropes, sheerlegs, poles, trestles, &c., in daily use.
Electric capstans and dumb capstans (movable except motor).
All meters with cost of fitting.
All cooking appliances with cost of fitting.
All heating ,, ,, ,, ,, ,,
All pipe layers' tools, apparatus and appliances, motor lorries, car, &c.
Spare armatures.

APPENDIX V.—ABSTRACT OF VALUES OF PLANT AS ADJUSTED WITH INSPECTOR OF TAXES, DEC. 1, 1927.

Description.	Written Down Value.		Percentage.	Amount.
	£	£		£ s. d.
1. Mains		3,536	2	70 14 0
2. Gasholders		8,021	3	240 12 0
3. Plant—				
Vertical retorts	11,478			
Condenser	1,058			
Scrubber and washer	200			
Station meter	100			
Purifiers	1,613			
Boilers and machinery	3,090			
Railway plant	1,110			
		18,676	5	933 16 0
4. Meters		6,722	10	672 4 0
5. Stoves		5,817	10	581 14 0
		£42,772		£2499 0 0

These figures work out at an average percentage of 5·84, as compared with the over-all rate of 3½ p.ct. previously granted.

The above valuation and rates of depreciation were upheld by the Appeal Court on Dec. 17, 1927.

APPENDIX VI.—COMPUTATION BY INSPECTOR OF TAXES.

Year to May 15, 1926.

GAS ACCOUNT.

Net Revenue.

	£
Balance—Profit per account	2,032
Add—Disallowable charges as noted below	1,402
	£3,434
Deduct—	
Profit (as brought out below) on public supplies	£20
Schedule A. let houses	46
One-sixth allowance under Sect. 18	50
	116
	£3,318
Less wear and tear as shown below	1,458
Amount assessable	£1,860

Disallowable Charges.

	£
Depreciation and renewal (general)	861
Meters—renewals	210
Stoves— ,,	131
Feu-duty	13
Special lighting—depreciation	31
Legal and loan expenses (capital)	156
	£1,402

Wear and Tear Allowance.

	£
Balance from last year	27,693
Capital expenditure during year (*less* railway siding)	15,156
	£42,849
Add renewals charged to revenue—	
Meters, £210; stoves, £131	341
	£43,190
Less proportion of vertical retorts expenditure treated as buildings	1,759
	£41,431
Sales scrap	119
	£41,312
Add new compressor	350
	£41,662
Wear and tear at 3½ p.ct. for 1926-27	1,458
	£40,204

Public Supply.

		£
Receipts (total), £13,468	(gas)	10,573
Expenses, £11,435		
Less disallowable charges 1,402		
10,033	,,	7,876
		£2,697

	C.Ft.	
Total consumption	41,739,000	
Public lighting	486,900	
Costs applicable to public lighting	4,869 / 417,390 × 7876 / 1	= 92
Credit in accounts for public lighting		112
Profit on public supplies		£20

The PRESIDENT (Mr. H. H. Gracie) thought it would be wise to adjourn the discussion until the annual meeting in September.

Mr. JAMES BELL (Dumbarton) moved a vote of thanks to the author, which was heartily passed. The rating question, he remarked, was imposing an increasing burden on industries generally; and he hoped Mr. Simpson's paper would give rise to an informative discussion in September.

MISCELLANEOUS NEWS.

HALIFAX GAS COLLEGE SUCCESSES.

In the recent examinations of The Institution of Gas Engineers in Gas Engineering and Gas Supply, the following successes have been gained by students of the Halifax Gas College:

Ordinary Examination in Gas	Engineering	. .	10 out of 29 External Certificates awarded.
,, ,, ,,	Supply	. . . .	16 out of 25 External Certificates awarded.
Higher ,, ,, ,,	Engineering	. .	10 out of 17 External Certificates awarded.
,, ,, ,, ,,	Supply	. . . .	2 out of 3 External Certificates awarded.
Diploma ,, ,, ,,	Engineering	. .	4 out of 7 Diplomas awarded; 2 first-class Diplomas with Distinction, 1 first class, and 1 second class.

These successes, Mr. Arthur Coe, the Principal, informs us, represent 81 p.ct. of the students of the College who sat in May, 1928, and 94 p.ct. of the students who actually completed their courses before sitting.

COURSE OF LECTURES AND DEMONSTRATIONS FOR SMOKE INSPECTORS.

In connection with the Public Health (Smoke Abatement) Act, 1926, which came into operation on July 1, 1927, the Ministry of Health suggested that the officials responsible for the abatement of smoke nuisances should be specially qualified, and that there should be courses of training for them.

In 1912 the Royal Sanitary Institute established an examination qualifying for the post of smoke inspector; and in order to assist candidates who are preparing for this examination, the Institute have arranged for a course of ten lectures covering the syllabus of the examination, and for practical demonstrations at works illustrating the management and working of different types of furnaces.

The fee for the course is £1 10s.

LECTURES.

At 6 p.m.

Monday, Oct. 8.—The laws, by-laws, and regulations affecting the emission or prevention of smoke, and methods of procedure in dealing with offenders.
By LAWRENCE W. CHUBB, *Secretary, Coal Smoke Abatement Society.*

Friday, Oct. 12.—The general principles underlying the production and transmission of heat; elementary chemistry of combustion.
By J. G. KING, Ph.D., F.I.C.

Monday, Oct. 15.—Fuels: solid, liquid, gaseous; different kinds of coal in use; their attributes, the locality whence obtained; special fuels.
By J. G. KING, Ph.D., F.I.C.

Monday, Oct. 22.—Combustion efficiency, boiler practice, chimneys; height, natural and artificial draught, and its measurement; composition and temperature of escaping gases. Proportion of carbonic acid as an indication of furnace efficiency.
By G. A. RENTON, M.I.Mech.E., A.M.I.Chem.E.

Monday, Oct. 29.—Furnaces: the essentials of construction; various types in use; purposes for which they are used.
By W. NEWTON BOOTH, B.Sc.(Lond.), Assoc.M.Inst.C.E., M.Inst.G.E.

Monday, Nov. 5.—Stoking: principles and practice of stoking; mechanical stokers; other apparatus and appliances for improving combustion.
By EDWARD W. L. NICOL, Assoc.Inst.C.E., M.I.Mar.E., A.M.I.E.E.

Monday, Nov. 12.—Smoke: nature and composition of; formation and predisposing causes; effects of various components of smoke on the atmosphere; vegetation and buildings.
By Dr. J. S. OWENS, M.D., Assoc.M.Inst.C.E., F.G.S.

Monday, Nov. 19.—Smoke prevention in boiler and other furnaces, and in domestic fires; conditions of smokeless combustion, methods of estimating or measuring density and colour of smoke; smoke charts and instruments. Other gases, dust and effluvia produced by combustion; their reduction and prevention.
By Dr. J. S. OWENS.

Monday, Nov. 26.—A general knowledge of the various industries in which furnaces are used, or from which products of combustion are given off.
By Dr. J. S. OWENS.

Monday, Dec. 3.—The main outlines of the application of gas, oil, and electricity, for the production of power in various industries.
By Dr. J. S. OWENS.

INSPECTIONS AND DEMONSTRATIONS.

Arrangements have been made for the students to visit the following works and institutions where Lancashire boilers, hand-fired furnaces, mechanical stokers, firing with coke and other types of fuel under different loads, methods for smoke prevention, will be demonstrated.

Wednesday, Oct. 24, 31, or Wednesday, Nov. 7, at 2.30 p.m.—Visits to a power station, and to a works where powdered fuel is used, conducted by Mr. B. SAMUELS, M.I.Mech.E.

Saturday, Nov. 27, at 2.30 p.m.—Visit to Metropolitan Asylums Board Hospital, Tooting Bec Road, S.W. 17. Conducted by Mr. EDWARD W. L. NICOL.

Wednesday, Nov. 21, at 2.30 p.m.—Visit to be conducted by Mr. E. H. LOWDEN.

Wednesday, Nov. 28, at 2.30 p.m.—Visit to Messrs. Manbre & Garton, Ltd., Winslow Road, Fulham Palace Road, Hammersmith, conducted by the Chief Engineer, Mr. G. A. RENTON.

Wednesday, Dec. 5, at 2 p.m.—Visit to Fuel Research Station of the Department of Scientific and Industrial Research, River Way, Blackwall Lane, East Greenwich, S.E. 10.

GAS REGULATION ACT APPLICATIONS.

DECLARATION OF CALORIFIC VALUE.

Mablethorpe and Sutton Gas Company, Ltd.—500 B.Th.U. (Sept. 30.)

MINISTRY OF HEALTH INQUIRY AT BLACKBURN.

Extensions to the Blackburn Corporation Gas-Works at Greenbank, at an estimated cost of £53,061, formed the subject of an inquiry by the Ministry of Health, on Aug. 3, on an application for permission to borrow this sum. The Ministry's representative was Mr. G. H. Thistleton-Dyer, M.Inst.C.E.

The DEPUTY TOWN CLERK said the extensions were necessary if a margin of safety for an uninterrupted supply was to be maintained, because, among other factors, there was an enormous increase in the summer consumption, due to the large number of gas cooking appliances now in use. It had been found that between 12 noon and 1 p.m. on Sundays more gas was sent out than during the corresponding period in the winter months. The gas sent out during this particular hour on Sunday, July 15, was 435,000 c.ft. So great was the demand that special plant had to be installed to maintain the pressure. Formulating the present scheme of extensions, the Gas Engineer (Mr. G. P. Mitchell) had not only in view the maintenance of efficiency, but was looking ahead, for Blackburn's consumption of gas continued to grow.

Replying to the Inspector, the DEPUTY TOWN CLERK said that a good deal of building development was taking place in Blackburn, and the demand for gas was likely to increase for many years to come. The increased consumption was due largely to the greater use made of appliances for cooking, &c.

The INSPECTOR said he did not think the Gas Department need fear competition from electricity in this direction.

It was stated that Blackburn's output of gas had risen from 769 million c.ft. in 1916 to 1123 millions in 1928, and the maximum daily output from less than 3 million c.ft. to nearly 5 millions.

AIRDRIE GAS DEPARTMENT.

At a meeting of the Airdrie Town Council on Aug. 2—Provost ARMOUR, J.P., in the chair—the report of Mr. Archibald Kellock, the Gas Engineer and Manager, was submitted and approved.

The report stated that during the past year the amount of gas made was 146,548,000 c.ft., compared with 154,579,000 c.ft.—a decrease of 8,031,000 c.ft., or 5·19 p.ct. The total quantity of gas sold was 137,432,900 c.ft., compared with 144,868,300 c.ft. for the preceding year—a decrease of 5·13 p.ct. Industrial meters consumed 13,948,300 c.ft., compared with 16,424,100 c.ft. Public lamps consumed 9,570,500 c.ft., as against 8,088,100 c.ft. for the previous year—an increase of 18·32 p.ct.

The total income of the undertaking amounted to £37,512, as against £44,552 for 1926-27. There was a surplus balance of £8235 to be carried to the credit of the net revenue account to meet the annual standing charges. The amount at the credit of this account being £8575 (inclusive of a credit balance of £309 brought forward from last year), and the total charges being £8237 4s. 5d., a credit balance of £338 was carried forward to next year.

Judge MARTYN, the Convener of the Gas Committee, stated that it would be impossible to reduce the price of gas at the present time.

CONTRACTS OPEN.

Locomotives.

The Manchester Corporation Gas Department are inviting tenders for a saddle tank steam locomotive at their Partington Works. [See advert. on p. 369.]

The Broseley Urban Council have accepted the tender of the Broseley Gas Company for the lighting of the street lamps at 52s. 3d. for the season. The Chairman mentioned that the price last year was 59s. per lamp.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

There is issued by the Newcastle Commercial Exchange a daily one-line report on the coal market, and it almost invariably describes it as dull, occasionally adding that there is no improvement. Its task is to be envied by one who sets out weekly to discuss market features, because really they are non-existent. There is not even any change to record in colliery quotations, since these are maintained from week to week by the ruling agreements. The one feature worth mentioning is that exporters are still finding difficulty in obtaining boats, and in some quarters it is assumed that, to a certain extent, orders must be accumulating against a time when tonnage will be in better supply. It is anticipated that, when this time comes, there may be a temporary demand for coal. In the meantime, so many collieries are having idle time, there would seem to be plenty of available supply for any rush that may occur.

Gas coals are, if anything, being rather better taken than in recent weeks. Wear Specials are still quoted at 15s. 3d to 15s. 6d. f.o.b., with best qualities at 14s. 9d., and others 13s. to 13s. 6d. Unscreened coking is nominally 13s. 3d. to 13s. 9d. It is freely offered for prompt shipment, and rather firmer for forward. Durham bunkers are quiet, only the best qualities finding anything like enough trade; these are round 14s. 3d., with seconds at 13s. to 13s. 3d. There is considerable forward inquiry for gas coke, and 20s. to 20s. 6d. f.o.b. is firmly quoted.

YORKSHIRE AND LANCASHIRE.

The holidays have interfered with the general working of the coal trade; collieries in South and West Yorkshire having "played" extra days.

Gas coals, owing to climatic conditions, are moving slowly, and contract quantities are not being absorbed.

House coal of all descriptions is in little demand, irrespective of price; and it is apparent that a few weeks will elapse before working is again normal.

The most serious aspect is that the heavy industries are not improving in regard to their fuel-using capacities; and the situation is engaging the most serious attention of the coalowners.

Export rules fairly satisfactory, with better prospects of forward shipment.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports:

South Yorkshire—Hards, Association, bunkers 18s., export 15s.; screened gas coal for export, 14s. to 15s. 6d.; washed trebles, 14s. 6d. to 15s.; washed doubles, 14s. 3d. to 14s. 6d.; washed singles, 13s. 6d. to 14s.; washed smalls, bunkers 13s. to 13s. 6d., export 11s.; rough slack, bunkers 11s. 9d. to 12s. 6d.; smithy peas, export 16s. 6d. to 17s. 6d. per ton.

West Yorkshire—Hartley's, export 13s. 3d. to 13s. 9d.; screened gas coal, 14s.; washed trebles, 14s. 3d. to 15s.; washed doubles, 13s. 6d. to 13s. 9d.; washed singles, 13s. to 13s. 9d.; washed smalls, 11s.; unwashed trebles, 14s.; unwashed doubles, 11s. to 11s. 3d.; rough slack, 18s. 9d. to 19s. 3d.; coking smalls, 7s. 9d. to 8s. 9d. per ton.

Derbyshire and Nottinghamshire—Top hards, bunkers 17s. to 17s. 9d., export 14s. 6d. to 15s. 6d.; cobbles, export 13s. 6d. to 15s.; washed trebles, 14s. 3d. to 15s.; washed doubles, 14s.; washed singles, 13s. 6d.; washed smalls, bunkers 12s. 6d. to 13s., export 10s. 6d.; unwashed doubles, export 11s. to 12s.; rough slack, bunkers 11s. 9d. to 12s., export 9s. to 9s. 6d. per ton.

Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, bunkers 15s. to 16s. 6d., export 12s. to 13s. 3d.; gas coal, export 20s. to 23s.; furnace coke, 18s. 6d. to 19s. 6d.; washed steam bunkers, 16s. 3d. to 16s. 9d. per ton.

MIDLANDS.

The seasonal depression is accentuated by the holidays. In the Cannock and Warwickshire areas very little coal was raised last week; and with all consuming establishments closed for a full week in most cases, demand was at a standstill. The market for gas coal and for coke is weak, and accumulations of slacks and smalls are only avoided by the policy of the collieries to restrict output. As it is, supply is in excess of demand, and occasionally sellers are prepared to make a small reduction for orders of any size. D.S. nuts may be said to run from a minimum of 9s. 6d. upwards, and good nutty slacks have a range of from 7s. to 10s. Summer prices for house coal will come to an end on Aug. 31, when an advance of 1s. a ton is expected; and this will probably be followed by a similar rise a month later. Meantime merchants are stocking in view of autumn requirements. Many householders filled their cellars prior to the holidays; and the announcement of higher prices will probably have the effect of sending many more on the market before the end of the month.

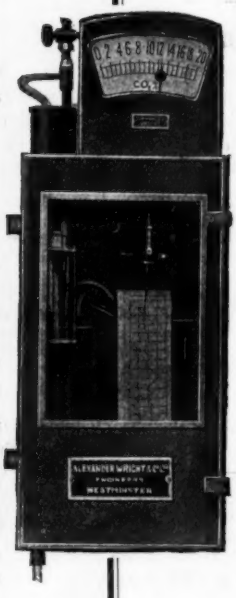
Wellingborough Gas Light Company, Ltd.—In their report for the half-year to June 30, the Directors state that the profit, after providing for interest and income-tax, amounts to £5360. This, added to the balance of £4901 brought forward, makes an available balance of £10,261. It is recommended that out of this sum dividends of 7½ p.ct. on the "original" and 6 p.ct. on the "additional" shares, less income-tax, be declared for the half-year. The payment of dividends and tax thereon will absorb the sum of £3846, leaving a balance of £6414 to be carried forward. It is mentioned that the extension of the Company's mains to Wilby has been completed, and that 45 customers in the village are now using gas.

CARBON - DIOXIDE

recorded by actual measurement

THE "S.A.W." CO_2 RECORDER

(Simmance, Abady & Wood's Patent)



makes a definite volumetric analysis of a gas sample drawn from a continuously moving stream. ERRORS due to gravity, osmotic pressure, humidity, etc., are consequently avoided. ACCURATE readings are obtained under all conditions of pressure or draught because there is no empirical scale.

BRITISH ORIGIN BRITISH MANUFACTURE

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ALEXANDER WRIGHT & CO., Ltd.

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 13.

Business in tar products continues quiet, and values generally remain unchanged as follows:

Pitch, about 50s. per ton.
Creosote, 7⅝d. to 7¾d. per gallon.
Pure benzole, about 1s. 8d. per gallon.
Solvent naphtha, 95/160, 1s. 5d. to 1s. 6d. per gallon.
Pure toluole, 1s. 11d. to 2s. per gallon.
Pyridine bases, about 5s. per gallon.

Tar Products in the Provinces.

Aug. 13.

There is little or no alteration in the markets for tar products, and business is still very quiet indeed.

Pitch is rather steadier, and producers are showing considerable resistance to the last fall.

The market is quiet for creosote, and there is little or no inquiry.

Water-white products remain firm. Tar acids generally are dull.

The average prices of gas-works products during the week were: Gas-works tar, 33s. 6d. to 38s. 6d. Pitch—East Coast, 47s. 6d. to 50s. f.o.b. West Coast—Manchester, 41s. 6d. to 42s. 6d.; Liverpool, 43s. 6d. to 45s.; Clyde, 42s. 6d. to 45s. Toluole, naked, North, 1s. 5d. to 1s. 6d. nominal. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 1½d. to 1s. 2d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid, 6d. to 6¼d.; salty, 5⅞d. to 6⅛d.; Scotland, 5⅞d. to 6⅛d. Heavy oils, in bulk, North, 8¼d. to 8½d. Carbolic acid, 60 p.ct., 2s. 2d. to 2s. 2½d. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.		s. d.	
Crude benzole . . .	0 10½	to	0 11	per gallon at works
Motor ,, . . .	1 4½	,,	1 5	,, ,, ,,
90 p.ct. ,, . . .	1 7	,,	1 8	,, ,, ,,
Pure ,, . . .	1 10	,,	1 11	,, ,, ,,

Gas Cooking at Charterhouse.—A large double-oven gas cooking range of modern type has been ordered for Charterhouse School, Godalming, from the Richmond Gas Stove and Meter Company (Radiation Ltd.). This will be the second of these ranges to be supplied to the school since the beginning of the year.

Welsbach Light Company.—The Directors of the Welsbach Light Company state that assents to the offer of the Imperial Chemical Industries exceeding the stipulated minimum of 76 p.ct. have been received from Welsbach shareholders, and that the offer has therefore become absolute and binding.

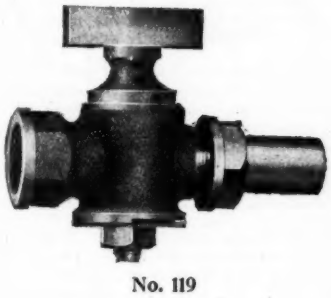
Labour-Saving Flats for Working-Class Tenants.—The latest development in the re-housing of the working classes in inner London is the erection of two large blocks of tenements at Somers Town, St. Pancras, designed on labour-saving lines. The two new blocks, which are known respectively as Aldenham House and Walcot House, and which were recently opened by Princess Mary, contain flats of various sizes, each provided with electric light, bath, and a good sized kitchen in addition to living-room and bedrooms. The kitchen fittings include a gas cooker and a gas wash-copper of modern pattern.

Reduction in Price at Barrow.—At a meeting of the Barrow Town Council on July 30, Alderman Whinnerah moved that the price of gas be reduced 4d. per 1000 c.ft. as from Oct. 1. In the General Purposes Committee the previous Monday, the members had rejected the proposition by 16 votes to 8. Alderman Whinnerah based his proposal mainly upon figures in a report issued by the Borough Treasurer in May last, and also upon the desire to give any possible benefit to consumers. There was a long discussion, Alderman Thompson, Chairman of the Gas and Water Committee, pointing out that it was the first time since he had been a member of the Council that any member had moved a direct reduction in the price of any commodity; it was a matter which ought to go back to the Gas Committee for consideration and report. He asked the Council to adopt this course. The Council voted in favour of the reduction as from Oct. 1, by 17 votes to 12. The present price by ordinary meter is 4s. 3d. per 1000 c.ft.

Satisfactory Working at Wolstanton.—A satisfactory state of affairs is revealed in the annual report of the Manager (Mr. G. H. Green) of the Wolstanton gas undertaking. This has just been presented to the Wolstanton Urban Council. In the past five years the Gas Committee have spent between £8000 and £9000 on plant and £2000 on mains, and they have now decided to spend another £20,000 on the erection of new plant. The Committee are meeting that expense out of revenue; and when it is met, a saving of something like £12,000 will be effected by the Council. The quantity of gas made during the past year was 126 million c.ft.—an increase of 4,634,000 c.ft. on the previous year. This, added to the gas bought in bulk, made a total output of 128 million c.ft. for the year. The total revenue from gas sold was £21,605—a decrease of £175; this being due to the reduction in the price of gas. The total income from all sources amounted to £28,372, a decrease of £811; and the total expenditure to £22,187, a decrease of £2824. The gross profit for the year was £6185, and the net profit £3321.

SOLID PLUG MAIN TAPS

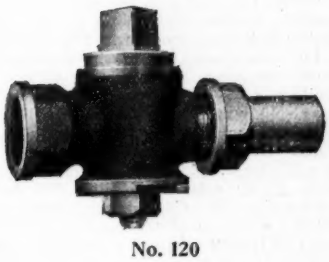
ROUNDWAY



No. 119

PRICES RIGHT
QUALITY RIGHT

MAY WE QUOTE YOU P
A SAMPLE WITH PLEASURE.



No. 120

SAWER & PURVES

(BRANCH OF METERS, LTD.)

NELSON METER WORKS, MILES PLATTING, MANCHESTER.

RADFORD METER WORKS, RADFORD ROAD, NOTTINGHAM.

45 & 47, WESTMINSTER BRIDGE ROAD, LONDON S.E.1.

Redhill Gas Company's Reduced Prices.—The Directors of this Company announce a reduction in the price of gas to consumers by ordinary meter within the borough of Reigate by ⅝d. per therm, and outside the borough by ¾d. per therm, to come into force after the reading of the meters for the Michaelmas quarter.

Cleveland Gas Company.—The report of the Directors for the half-year ended June 30 states that the profit made was £512, which, with the amount brought forward, makes £3921. It is proposed to dispose of this as follows: Payment of a dividend at the rate of 3 p.ct. per annum (less income-tax) for the half-year, £597; placing of £126 to the contingent fund; and carrying forward to next half-year's account £3197.

Gas Meter Testing at Blackburn.—The annual report of the Inspector of Gas Meters for the Borough of Blackburn, just issued, shows that 2441 meters were submitted by the Corporation Gas Committee. Of these, 2346 were correct and 95 incorrect. Of the 95 rejected meters, 28 were disputed meters, so that the actual percentage of rejections on repaired meters was only 2·78. The total of disputed meters submitted during the year was 43—an increase of 13 over 1927 and of 26 over 1926. Of these 43, 28 were found to be inaccurate, and 15 accurate.

Price of Gas Reduced at Peterhead.—The price of gas at Peterhead has been reduced from 5s. to 4s. 9d. per 1000 c.ft. In his annual report for the year ended May 15 last, Mr. William S. Easson, the Manager of the Gas Department, states that the gas manufactured was 76 million c.ft.—an increase of 1·19 p.ct. over the preceding year. After the big increase in the manufacture for the year 1926-27, due to the coal stoppage, this further increase is highly satisfactory. The balance of £207 overpaid in 1926-27 was cleared off; £900 was placed to the credit of depreciation and renewals fund; and £51 was carried forward.

Good Working at West Bromwich.—The West Bromwich Gas Committee have presented to the Town Council the annual accounts of the undertaking for the year ended March 31 last. The total income for the year was £112,904, compared with £121,915 for the previous year—a decrease of £9010. The gross profit on the undertaking was £15,549; and after payment of interest and sinking fund charges, which totalled £9452, there was a net profit of £6096, compared with a net loss of £5519 in 1926-27. The net revenue appropriation account showed a balance in hand of £5943. The report and statement of accounts were adopted.

Gas Escape Causes Death.—At an inquest at Barldon on Aug. 7, the Coroner (Mr. Edgar Wood) found that a woman's death had been brought about by gas poisoning, believed to have been caused by an escape from a broken main near her house. The woman, Annie A. Burlison, aged 60, died at the house of her sister on July 6. It was stated that on Dec. 23 last year she was found in an armchair in the living-room of her house. There was a strong smell of gas in the cellar and in the scullery, and the gas was lighted in the living-room. Miss Burlison was taken to St. Luke's Hospital. Arthur Banks, a gas inspector employed by the Bradford Corporation, said that an escape of gas was reported at a house in Lincoln Terrace on Dec. 23, and while he was making an examination his attention was called to Miss Burlison's house. There he found that windows had been made draught-proof by layers of oilcloth and paper. Nine or ten feet away from her house the ground was taken up, and it was found that a main was cracked. The Coroner returned a verdict of "Death from premature senile decay and neurasthenia, brought about by accidental gas poisoning on Dec. 23."

Good Working at Coventry.—The Coventry Corporation Gas Department report a profit of £28,374 for the past year, as compared with a loss of £36,592 for the preceding year. The increased consumption, together with the reduced price at which coal contracts were made, enabled reductions in the charges to be established amounting to 8d. per 1000 c.ft. The amounts incorporate the figures for a full year's working of the Kenilworth undertaking acquired by the Corporation. The gas made at the Foleshill Works was 2366 million c.ft.—an increase over the previous year of 5·15 p.ct. The gas sold was 2231 million c.ft., divided as follows: Ordinary consumers, 58·27 p.ct.; prepayment, 39·12 p.ct.; public lighting, 2·61 p.ct. At the Kenilworth Works, 51 million c.ft. was made and 46 million c.ft. sold. The receipts showed an increase of £37,976, including £9323 sales at Kenilworth. Receipts from residuals decreased by £50,136. Capital expenditure amounted to £139,246, including the purchase of the Kenilworth undertaking £37,910, new buildings and plant £59,501, and new mains £32,296. The profit now reported and a sum from the reserve fund enable the current year to be started free from any adverse balance.

Harpenden Gas Company.—At the general meeting of the Harpenden District Gas Company, the Chairman (Mr. T. H. Martin), in presenting the Directors' report and statement of accounts for the year ended June 30, mentioned that the expenditure on revenue account was less than in the previous year, owing chiefly to the reduction in the price of coal following the coal stoppage. On the other side of the account, however, he pointed out that there had been a decrease in the amount received for gas, due to the reduction in the price made in September, 1927. Also, the receipts from residuals showed a reduction, due to the drop in prices. A dividend at the rate of £7 14s. p.ct. on the ordinary stock (6 p.ct. standard), less income-tax, and subject to the interim dividend already paid, was declared. The Chairman was pleased to announce that another reduction of ¼d. per therm would be made as from the reading of the meters at Michaelmas next. There had been further extensions of mains, and 90 additional ordinary and 70 prepayment consumers had been connected-up during the year. A vote of thanks was accorded to the Managing Director (Mr. E. H. Martin), staff, and workmen, for the services they had rendered during the year.

Auchterarder Gas Price Reduced.—The annual meeting of the Auchterarder Gas Light Company was held recently—Mr. John T. Stevenson, Chairman of Directors, presiding. It was agreed to pay a dividend of 5 p.ct. and a bonus of 6d. per share, free of income-tax; and it was intimated that the Directors had agreed to reduce the price of gas by 5d. per 1000 c.ft. as from May 31 last. The charge will now be 5s. 10d. per 1000 c.ft.

Increased Sales at Bridport.—The report of the Directors of the Bridport Gas Company, Ltd., for the year ended June 30 last states that the sales of gas have increased by over 1 million c.ft. The sum of £250 has been placed to reserve fund, and dividends at the rate of 5 p.ct. on the "A" preference, 6¼ p.ct. on the "B" cumulative preference, and 10 p.ct. on the ordinary shares, less tax, payable on Sept. 1, have been declared. A balance of £681 has been carried forward.

A Blackburn Corporation gas exhibition held recently resulted in a favourable balance of £50.

The Bakewell Urban District Council have decided to reduce the price of gas by 5d. per 1000 c.ft. for lighting and heating purposes.

The estimates of the Perth Gas Committee for the year 1928-29 embrace, it is understood, a reduction in the price of gas of 1s. per 1000 c.ft.

While oiling shafting at the Blackpool Corporation Gas-Works, William T. Rogers had his clothing entangled, and was whirled round. He suffered injuries to the ribs, left arm, and legs.

During the night of July 31, more than a hundred gas mantles used for lighting stairways in Greenock tenements were wantonly destroyed. The person responsible confined his attention to gas mantles, electric light bulbs being left untouched.

Nearly the whole of Southport was inconvenienced on the night of Aug. 6 by a breakdown at the electricity works. Community singing in the places of amusement, to ward off the terrors of darkness, must have been poor solace to those who had paid entertainment tax.

The Castle Donington Council recently had before them the question of street lighting, when the claims of both gas and electricity were discussed. In the end the Council decided to enter into an agreement with the Long Eaton Gas Company, for one year, on somewhat more favourable terms than last year.

The report and statement of accounts of the gas undertaking of the Newtown Urban Council show that the production of gas for the year was 19 million c.ft. The revenue for the year was £8935, and the profit on the revenue account was £2197. After meeting all expenses, there was a surplus in aid of the rates of £35.

The Middlesbrough Corporation have decided to apply to the Ministry of Health for sanction to the borrowing of £14,000 in respect of expenditure on new mains during the year ended March 31 and during the ensuing three years, at the average of £4000 a year. The Gas Manager (Mr. C. F. Blincoe) has been asked to report on the possibility of introducing a reduced tariff for gas used for cooking, heating, and power purposes.

The Camborne Gas Company Directors report a balance to the credit of the profit and loss account of £3266, and recommend a dividend at the rate of 6 p.ct. per annum, leaving £2354 to be carried forward. During the past twelve months 89 new customers have been added, and the Directors state that the reconstructed showrooms, enabling an adequate display of modern appliances to be shown in appropriate settings, have been greatly appreciated.

The annual sports of the Plymouth Gas Light and Coke Company took place at Dunston Park, Plymstock, on Saturday, Aug. 11, and provided keen racing and close finishes which were witnessed with great interest by an assembly of about 500 people. A feature of the meeting was the prowess of J. G. Monsen, who secured five first prizes. The prizes were distributed by Mrs. Hoyte, and the arrangements for the meeting were made by a Committee of which Mr. J. H. Ellis was President and Mr. J. W. Walters Chairman.

Resolutions of protest against the removal of the Exmouth Gas-Works from the Fore Street neighbourhood to the Imperial Road district were passed on Aug. 10 by a unanimous vote at a crowded meeting of residents in the area. Mr. J. Carter, who presided, said the proposed change would be the ruination of the lodging and apartment houses in the neighbourhood. He was sure that if they made their representations soon enough, the rumoured proposition would be defeated. It was decided to send petitions to Lord Clinton and the Urban Council. A subscription list to promote the agitation against the proposal was opened, and officers were appointed.

There was a discussion at a meeting of the Lytham St. Annes Council on July 31 on a proposal of the Gas Committee that £1000 from net revenue appropriation account be transferred to gas reserve fund, the remaining £1575 being retained as a working balance. Mr. Turner said that the Gas Committee had £10,000 in reserve fund, but the Committee had capital commitments of £274,143. Mr. Beaver (Chairman of the Gas Committee) remarked that a large proportion of their capital was in derelict works, and the time must come when repairs and renewals would be a heavier item than in the past. They had also the price-reduction policy of the Council to consider. An amendment that consideration of the disposal of the money by the Gas Committee be deferred until the end of the financial year was carried. The Gas Committee last year had a gross profit of £19,385 and a net profit of £2306.

STOCK MARKET REPORT.

At the close of last week quiet conditions prevailed on the Stock Exchange, and dealers were mostly engaged in arranging for the Settlement; but in spite of the dulness, due partly to the holidays and partly to the doubts as to the monetary conditions, optimistic views were expressed of a revival of business in the early autumn. At the present time there are few bright spots, and generally the "bear" is much in evidence.

Gilt-edged stocks were in a subdued state during the whole of the week, for which anticipation of a further rise in the New York re-discount rate was mainly responsible. The Funding Loan was the most noticeably affected.

In the Miscellaneous Market there was some profit-taking in Gramophone shares; but with continued support from New York, prices were maintained, and in some cases reached higher levels.

The Gas Market was no exception to the general rule, business being slack all round. The few buyers experienced difficulty in securing stock owing to standing orders from Trust companies. There were few changes of note in the quotations. The most important was a rise of 2 points in the Lea Bridge 5 p.cts. ordinary; and it will be noticed that Bristol 5 p.ct. maximum maintains its high level with a rise of 1 to 90-91. Among the dividend announcements of the week is that of the South Shields Company, who are distributing 8½ p.ct. on the consolidated stock (the same).

The following transactions were recorded during the week:

On Tuesday, Bombay 23s., Continental Union 33, Gas Light and Coke 18s. 9d., 18s. 9⅞d., 18s. 10½d., 18s. 11¼d., 19s., 19s. 0⅜d., Imperial Continental 3½ p.ct. debenture 69½, 70, Lea Bridge 5 p.ct. 98½, Newcastle-on-Tyne 3½ p.ct. 16s. 9d., Primitiva 24s. 1¼d., 24s. 3d., South Suburban 5 p.ct. debenture 98½, Tottenham "B" 97½. Supplementary prices, Brighton and Hove 4 p.ct. debenture 78, British 4 p.ct. debenture 77, Gas Light and Coke 5 p.ct. debenture 1952-57 100½, Redhill "B" 81¼.

On Wednesday, Alliance and Dublin 95½, Commercial 97½, 98, 98½, Continental Union 33, Gas Light and Coke 18s. 10½d., 19s., 3½ p.ct. maximum 62½, 63, 63¼, Imperial Continental 169, 170, 172, 3½ p.ct. debenture 69½, 70, Primitiva 4 p.ct. consolidated debenture 76, 76⅜, South African 5¼, South Metropolitan 105¼, 105½, 6 p.ct. preference 112, South Suburban 5 p.ct. 107, 5 p.ct. debenture 99, Tottenham "B" 96⅜, 97, 97½. Supplementary prices, Barnet 4 p.ct. debentures 77, 77⅜, Croydon 5 p.ct. debenture 98, Hornsey 4 p.ct. debenture 72.

On Thursday, Bombay 23s. 6d., Bournemouth 6 p.ct. preference 11⅛, Commercial 3 p.ct. debenture 59½, Croydon sliding-scale 112, Gas Light and Coke 18s. 10½d., 19s., 19s. 1½d., 3 p.ct. debenture 60½, Imperial Continental 170, 173, Montevideo 95½, Primitiva 23s. 9d., 23s. 10½d., 24s. 6d., South Metropolitan 105¼, 105½. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 100½, Metropolitan (of Melbourne) 9⅜, 9⅛, Pinner 5¼ p.ct. debentures 100½, 101.

On Friday, Commercial 97⅜, Gas Light and Coke 18s. 10½d., 19s., 19s. 1½d., 4 p.ct. preference 78½, 3 p.ct. debenture 61, Imperial Continental 171, Newcastle 16s. 6d., 16s. 7½d., 16s. 9d., Primitiva 23s. 9d., 24s. 1½d., South Metropolitan 105½, 106¼, 106⅝. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 1952-57 100⅜.

Money was extremely plentiful in Lombard Street, and it was possible to secure fresh funds for the night at 3 p.ct. Old day-to-day loans were mostly renewed at 3½ p.ct. The average rate at which the Treasury Bills were allotted—£4 5s. 4·65d. p.ct.—was in accordance with expectation, and was 1s. 2d. p.ct. above the previous week's rate, being the highest since February last. The increase had little effect on discount rates.

On the Foreign Exchange Market there was a further rise in the German exchange, marks being quoted finally at 20.38¼. The dollar sterling was slightly lower at 4.85$\frac{7}{16}$; French francs cheaper at 124.22½; pesetas recovered to 29.07; Belgas finished at 34; and Italian lire and Dutch florins were unchanged.

Silver receded in the absence of support to 27¼d. per oz.; while Gold remained unchanged at 84s. 11½d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21, 1927. The Banks' deposit rate is 2½ p.ct., and the deposit rates of the discount houses are 2½ p.ct. at call and 2¾ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Aug. 10.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 9	5	5	Aldershot 5 p.c. max. C.	74—79	..	
412,932	,,	,,	4	4	Do. 4 p.c. Pref.	69—72	..	..
1,661,868	,,	Apl. 12	7	7	Alliance & Dublin Ord.	94—97	..	..
874,000	,,	July 12	4	4	Do. 4 p.c. Deb.	68—66	..	95½
523,654	,,	Mar. 8	7	7	Barnet Ord. 7 p.c.	111—114	..	..
800,000	1	Apl. 26	1/7½	1/7½	Bombay, Ltd.	22/—24/-	+1/-	23/—23/6
170,000	10	Mar. 8	8½	8½	Bournemouth 5 p.c.	124—124	..	..
500,050	10	,,	7	7	Do. B 7 p.c.	12½—12¾	..	..
875,000	10	,,	6	6	Do. Pref. 6 p.c.	11—11¾	..	..
80,000	Stk.	July 12	3	3	Do. 3 p.c. Deb.	56—59	..	11¾
169,025	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..
357,900	,,	Mar. 8	7½	7½	Brighton & Hove 6 p.c. Con.	116—119	..	..
341,880	,,	,,	6/8/6⅔	6⅔	Do. 5 p.c. Con.	103—106	..	..
1,327,500	,,	July 26	5	5	Bristol 5 p.c. max.	90—91a*	+1	..
895,000	,,	Mar. 22	8	7	British Ord.	113—116	..	..
100,000	,,	June 28	7	7	Do. 7 p.c. Pref.	111—114	..	..
190,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	73—76	..	..
900,000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	94—97	..	..
100,000	10	May 24	6	8	Cape Town, Ltd.	7½—8¼	..	..
150,000	10	Apl. 26	4½	4½	Do. 4½ p.c. Pref.	6¼—7½	..	..
696,860	Stk.	June 28	4½	4½	Do. 4½ p.c. Deb.	70—75	..	..
827,560	,,	July 26	6	6	Cardiff Con. Ord.	96—99*	..	..
157,150	,,	June 28	7½	7½	Do. 7½ p.c. Red. Deb.	100—103	..	..
79,185	1	Feb. 23	5	6¼	Chester 5 p.c. Ord.	90—95b	..	..
24,495	1	Apl. 26	1/9/-	1/9/-	Colombo Ltd. Ord.	31/—33/-	..	..
376,403	1	Apl. 12	1/4½	1/4½	Do. 7 p.c. Pref.	20/—22/-	..	..
187,843	1	,,	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	23/—25/-	..	..
2,073,380	Stk.	July 26	1/7½	1/7½	Do. 8 p.c. Pref.	21/—23/-	..	..
475,000	,,	June 14	7	6	Commercial Ord.	96—99*	..	..
800,000	,,	Sept. 29	8	8	Do 3 p.c. Deb.	57—60	..	97½—98½
900,000	,,	Mar. 8	11	11	Continental Union, Ltd.	33—36	..	59½
787,560	,,	Mar. 8	7	7	Do. 7 p.c. Pref.	92—97	..	33
408,100	,,	,,	6½	7	Croydon sliding scale	110—113	..	112
493,370	,,	,,	5	5	Do. max. div.	84—87	..	..
55,000	,,	Mar. 8	7	10	Derby Con.	115—130a	..	..
309,000	,,	June 28	4	4	Do. Deb.	71—73c	..	..
50,000	,,	Mar. 8	5	5	East Hull Ord. 5 p.c.	76—79	..	..
1,002,180	,,	June 28	5	5	Eastbourne 5 p.c. Deb.	91—96	..	..
18,705,480	10	Mar. 22	14	16	European, Ltd.	8—9	..	..
2,600,000	Stk.	July 26	5/1/4	5½	Gas Light & Coke 4 p.c. Ord	18/9—19/3/*	..	18/9—19/1½
4,157,020	,,	,,	3½	3½	Do. 8½ p.c. max.	61½—63½*	..	62½—63½
5,809,890	,,	,,	4	4	Do. 4 p.c. Con. Pref.	77—80*	..	78¼
181,815	,,	June 14	3	3	Do. 3 p.c. Con. Deb.	59—62	..	60½—61
1,642,770	,,	,,	6	6	Do. 6 p.c. Br'tf'd Rd. Db.	103—106	..	..
42,000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	99—101	..	..
92,500	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
288,740	,,	Mar. 8	6⅔	7½	Hastings & St L. 5 p.c. Conv	90—95	..	..
70,000	,,	,,	5½	5½	Do. 8½ p.c. Conv.	70—75	..	..
178,200	10	Apl. 26	†10	†10	Hongkong & China, Ltd.	18½—14½	..	..
1,976,000	Stk.	Mar. 8	5	5	Hornsey Con. 3½ p.c.	83—85	..	..
233,180	,,	May 24	10	10	Imperial Continental Cap.	168—173	+2	169—173
235,242	,,	Feb. 9	8½	8½	Do. 3½ p.c. Red. Deb.	68—70	..	69½—70
2,145,907	,,	Mar. 8	7	7	Lea Bridge 5 p.c. Ord.	97—100	+2	98½
600,000	,,	Feb. 23	5½	5½	Liverpool 5 p.c. Ord.	92½—93b	+½	..
165,786	,,	Mar 22	7	7	Do. 7 p.c. Red. Pref.	103½—105½b	..	..
75,000	,,	Feb. 23	9	8	Maidstone 5 p.c. Cap.	115—120	..	..
541,920	5	June 14	18	18	Malta & Mediterranean	5½—6½	..	..
2,081,815	Stk.	May 24	15	17	Montevideo, Ltd.	94½—96½	..	95½
260,929	,,	Mar. 8	5	5	Newcastle & Gateshead Con.	16/3—17/-d/	..	..
691,705	,,	,,	4	4	Do. 4 p.c. Pref.	74½—75½d	..	..
131,780	,,	June 28	8½	8½	Do. 8½ p.c. Deb.	65½—66½d	+½	..
300,000	,,	Mar. 8	6/18/0	6/18/0	North Middlesex 6 p.c. Con.	98—101	..	..
188,190	,,	Apl. 26	9	7	Oriental, Ltd.	116—121	..	..
414,500	,,	June 28	7½	7½	Plym'th & Ston'house 5 p.c.	107—112	..	..
286,782	,,	Feb. 23	7½	7½	Portsm'th Con. Stk. 4 p.c. Std.	101—104	..	..
2,334,464	,,	,,	5	5	Do. 5 p.c. max.	77—80	..	..
244,500	1	—	—	—	Primitiva Ord.	23/6—24/6	..	23/9—24/6
695,000	100	June 1	4	4	Do. 4 p.c. Red. Deb.	91—94	..	..
416,345	Stk.	July 26	4	4	Do. 4 p.c. Red. Deb. 1911	76—78*	..	..
150,000	,,	June 28	4	4	Do. 4 p.c. Cons. Deb.	75—77	..	..
270,000	10	Mar. 22	6	6	San Paulo 6 p.c. Pref.	8⅜—8¾	..	76—78½
419,968	Stk.	Mar. 22	6	6	Sheffield A	103—105e	..	..
1,047,000	,,	,,	6	6	Do. B	103—105e	..	..
90,000	,,	,,	6	6	Do. C	103—105e	..	..
6,609,895	10	June 14	13	14	South African	4—6	..	..
500,000	Stk.	July 26	7½	6	South Met. Ord.	105—107*	+1	5½
1,895,445	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	108—111*	..	105½—106½
784,000	,,	July 12	8	8	Do. 3 p.c. Deb.	58—61	..	112
91,500	,,	Mar. 8	6½	6½	Do. 6½ p.c. Red. Db.	100—102	..	..
1,248,795	,,	Feb. 23	8½	8½	South Shields Con.	110—112d	..	..
368,837	,,	July 26	6½	6½	South Suburban Ord. 5 p.c.	105—108*	..	..
647,740	,,	June 28	5	5	Do. 5 p.c. Deb.	96—99	..	107
121,275	,,	Mar. 22	5	5	South'mpton Ord. 6 p.c. max.	78—80	..	98½—99
250,000	,,	June 28	4	4	Do. 4 p.c. Deb.	72—75	..	..
300,000	,,	Mar. 8	7	7	Swansea 7 p.c. Red. Pref.	100—103	..	..
190,000	,,	June 28	6½	6½	Do. 6½ p.c. Red. Deb.	99—102	..	..
882,275	,,	July 26	7½	8	Tottenham District A 5 p.c.	116—121*	..	..
150,000	,,	,,	6½	6½	Do. B 5½ p.c.	95—98*	..	..
181,955	,,	,,	5½	5½	Do. 5½ p.c. Pref.	96—99*	..	96½—97½
	,,	June 14	4	4	Do. 4 p.c. Deb.	76—79	..	..
239,094	,,	Mar. 8	6½	6½	Uxbridge, Maidenhead, & Wycombe 5 p.c.	98—101	..	..
68,880	,,	,,	5	5	Do. 5 p.c. pref.	90—95	..	..
80,000	,,	July 12	8½	8½	Wandsworth, Wimbledon, and Epsom—	86—90	..	..
255,636	,,	,,	7	7½	Wandsworth A 5 p.c.	126—129	..	..
422,235	,,	,,	5/12/0	6½	Do. B 5½ p.c.	108—118	..	..
353,000	,,	,,	6½	6½	Do. C and New	96—101	..	..
98,000	,,	,,	7½	7½	Do. Wimbledon 5 p.c.	104—109	..	..
200,000	,,	,,	5	5	Do. Epsom 5 p.c.	110—115	..	..
88,413	,,	,,	8	8	Do. 5 p.c. Pref	88—91	+3	..
294,743	,,	June 28	4	4	Do. 3 p.c. Deb.	56—59	..	..
	,,	,,			Do. 4 p.c. Deb.	75—78	..	..

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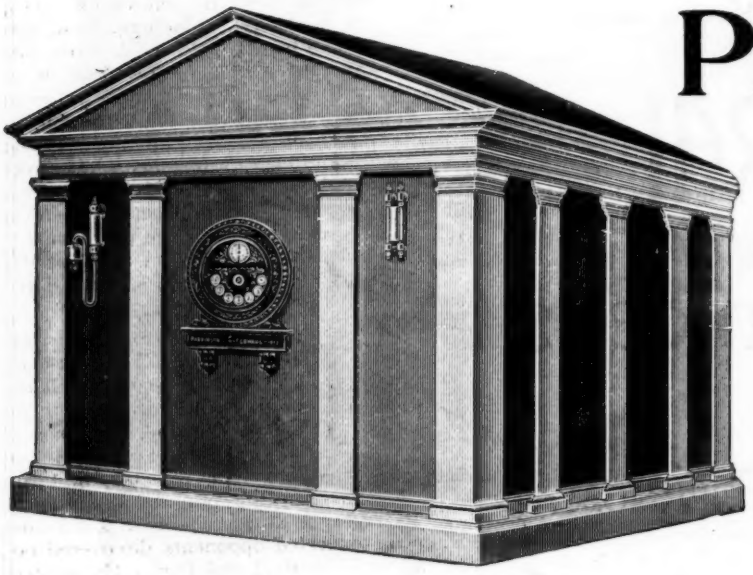

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